EDISON ELECTRIC INSTITUTE BULLETIN

VOLUME II DECEMBER 1934 NUMBER 12

The Season's Greetings

STATISTICAL DATA OF THE ELECTRIC LIGHT AND POWER INDUSTRY

Compiled Monthly by the Edison Electric Institute—Covers 100% of the Industry

DURING THE MONTH OF OCTOBER

	1934	1933	%
Kilowatt-hours Generated* (net)			
By fuel	4,863,362,000	4,600,980,000	+ 5.7
By Water Power	2,457,204,000	2,324,391,000	+ 5.7
Total Kilowatt-hours generated	7,320,566,000	6,925,371,000	+ 5.7
Additions to Supply			
Energy purchased from other sources	159,990,000	240,926,000	−33.6
Net International Imports	73,469,000	74,748,000	− 1.7
Total	233,459,000	315,674,000	−26.0
Deductions from Supply			
Energy used in electric railway departments	50,194,000	59,589,000	−15.8
Energy used in electric and other departments	118,909,000	87,044,000	+36.6
Total	169,103,000	146,633,000	+15.3
Total Energy for Distribution	**7,384,922,000**	**7,094,412,000**	**+ 4.1**
Energy Lost in Transmission, Distribution, etc.	**1,397,138,000**	**1,314,408,000**	**+ 6.3**
Kilowatt-hours Sold to Ultimate Consumers	**5,987,784,000**	**5,780,004,000**	**+ 3.6**
Sales to Ultimate Consumers (kw-hrs)			
Domestic Service	1,081,444,000	1,002,786,000	+ 7.8
Commercial—Small Light and Power (Retail)	1,112,155,000	1,067,991,000	+ 4.1
Commercial—Large Light and Power (Wholesale)	3,141,751,000	3,068,000,000	+ 2.4
Municipal Street Lighting	193,674,000	191,047,000	+ 1.4
Railroads—Street and Interurban	352,788,000	331,749,000	+ 6.3
Railroads—Electrified Steam	59,199,000	58,363,000	+ 1.4
Municipal and Miscellaneous	46,773,000	60,068,000	−22.1
Total Sales to Ultimate Consumers	5,987,784,000	5,780,004,000	+ 3.6
Total Revenue from Ultimate Consumers	$155,811,500	$150,390,400	+ 3.6

DURING TWELVE MONTHS ENDING OCTOBER 31st

Kilowatt-hours Generated* (net)			
By fuel	53,216,434,000	46,429,429,000	+14.6
By Water Power	30,370,640,000	31,974,063,000	− 5.0
Total Kilowatt-hours Generated	83,587,074,000	78,403,492,000	+ 6.6
Purchased Energy (net)	3,131,732,000	2,828,309,000	+10.7
Energy Used in Electric Railway and Other Departments	2,013,038,000	1,916,809,000	+ 5.0
Total Energy for Distribution	84,705,768,000	79,314,992,000	+ 6.8
Energy Lost in Transmission, Distribution, etc.	**14,632,890,000**	**14,199,733,000**	**+ 3.1**
Kilowatt-hours Sold to Ultimate Consumers	**70,072,878,000**	**65,115,259,000**	**+ 7.6**
Total Revenue from Ultimate Consumers	$1,822,895,600	$1,777,731,600	+ 2.5
Important Factors			
Per cent of energy generated by waterpower	36.3%	40.8%	
Average pounds of coal per kilowatt-hour	1.45#	1.45#	
Domestic Service (Residential Use)			
Average Annual Consumption per Customer (kw-hr)	626	604	+ 3.6
Average Revenue per Kw-hr (Cents)	5.32¢	5.51¢	− 3.4
Average Monthly Bill per Domestic Customer	$2.78	$2.77	+ 0.4

BASIC INFORMATION AS OF OCTOBER 31st

Generating Capacity (kw)—Steam	23,800,100	24,069,000	
—Water Power	9,006,400	8,974,000	
—Internal Combustion	468,100	461,300	
Total Generating Capacity in Kilowatts	33,274,600	33,504,300	
Number of Customers			
Farms in Eastern Area (Included with Domestic)	(517,332)	(505,956)	
Farms in Western Area (Included with Commercial—Large)	(209,798)	(204,961)	
Domestic Service	20,441,774	19,921,921	
Commercial—Small Light and Power	3,724,998	3,689,316	
Commercial—Large Light and Power	530,976	530,532	
All Other Ultimate Consumers	69,507	65,944	
Total Ultimate Consumers	24,767,255	24,207,717	

*By courtesy of the U. S. Geological Survey with deductions for certain plants not considered Electric Light and Power Enterprises.

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EDISON ELECTRIC INSTITUTE BULLETIN

Volume II DECEMBER, 1934 No. 12

CONSTITUTIONALITY OF TVA ACT IS QUESTIONED BY MESSRS. BAKER AND BECK

A joint opinion as to the constitutionality of the Tennessee Valley Authority Act has been rendered to Mr. Thomas N. McCarter, President of the Institute, by the Honorable Newton D. Baker and the Honorable James M. Beck, at the request of Mr. McCarter.

The opinion holds, in part, that the legislation setting up the Tennessee Valley Authority and the plan of action being undertaken by the Authority thereunder are unconstitutional. Further it states that even conceding the constitutionality of the Act, the Authority's present activity and expressed intentions for the future in the field of production and distribution of electricity are beyond the scope of the powers granted by Congress.

President McCarter on November 25th issued a statement regarding retention of the services of the two noted constitutional lawyers and the reasons therefor. The statement reads:

Statement by Mr. McCarter

"There has been so much anxiety on the part of a multitude of investors in public utility securities as a result of the barrage of attack leveled against the Electric industry by various Federal agencies, and so much dissatisfaction on their part and that of many members of the industry over the apparent inaction in reference thereto by the Institute and its leaders, that I deem it proper to state the following facts:

"About a month ago, acting upon my own initiative, I secured the services of the Honorable Newton D. Baker of Cleveland, Ohio, and of the Honorable James M. Beck of Washington, both constitutional lawyers of national reputation, to render opinions, jointly if they were in agreement, otherwise separately upon the constitutionality of certain legislation enacted by the Congress vitally affecting the Electric industry, under which the Government is carrying on great activity; also to pass upon the legality of the doings of certain governmental agencies upon the assumption that the legislation was constitutional, and in general to pass upon the legality of the Government's activities so far as they relate to Federal governmental competition with the industry. In all some four or five basic problems were presented for their consideration.

"I requested them to pass first upon the questions presented involving the constitutionality and the legality of the Tennessee Valley Authority undertaking, because of its tremendous and immediate importance.

"At the last meeting of the Board of Trustees of the Institute, held on the fifteenth day of November, I reported what I had done. Thereupon the Trustees passed the following resolution:

> RESOLVED, that the Edison Electric Institute is of the opinion that the public interest requires an early adjudication by the Courts, as to the merits of pending questions which involve the determination whether there are limits under the Constitution beyond which government may not go in using public funds to destroy by competitive construction and operation the existing investments of private capital in public utility enterprises, and it is further
>
> RESOLVED, that the President, or the Executive Committee of the Institute are hereby authorized and empowered to take any necessary steps of cooperation in behalf of the early declaration and determination of the powers of government and the rights of investors as to competitive projects initiated by government, and are authorized to employ and consult such counsel, engineers, and economists, and to take such further steps, as in their judgment may be necessary or proper to bring about a prompt adjudication and settlement of the matters in controversy.

"I have now received a joint opinion of the two lawyers relating to the Tennessee Valley Authority project. It is a lengthy and convincing opinion buttressed by a wealth of citations from decisions of the United States Supreme Court. It holds in substance that the legislation relating to this project and the plan of governmental action set up therein is palpably unconstitutional; that the legislation, if valid, does not authorize much that has either been done by the Authority or that it is preparing to do, which is therefore illegal, and that the cooperative actions of the Tennessee Valley Authority and the Public Works Administration, forcing sales of property of private utilities under threat of gifts and loans to municipalities are illegal. This opinion is now being printed. Opinions on the other questions submitted will follow as soon as prepared.

"I hope to have an early opportunity to lay this whole matter before the President of the United States."

Letter to Messrs. Baker and Beck

Printed copies of the Opinion, which runs to some fifty pages, were made available on Nov. 30th. Printed with the Opinion and reproduced herewith is

the text of so much of a letter submitted by President McCarter to Messrs. Baker and Beck as is in substance answered by the Opinion:

October 25, 1934.

To the—
HONORABLE NEWTON D. BAKER,
Cleveland, Ohio.
HONORABLE JAMES M. BECK,
Washington, D. C.
Sirs:

Administrative acts and policies of the Federal Government have brought into jeopardy nearly $12,000,000,000 of actual investment in the electric industry throughout the United States. These investments were made in good faith by insurance companies, savings banks, other fiduciaries, and private citizens, generally with the approval of the State Governments as to the amounts and type of securities issued; and the electric industry has become one of the largest taxpayers in the United States.

If the wanton destruction which government is now inflicting upon these enterprises and investments were continued, the volume of employment and payrolls in private industry will be greatly lessened, labor will be unsettled and displaced, sources of State and local revenues through taxes will be destroyed, the rates and service of public utilities will be removed from State and local control, and private capital will be driven from investment in the public service enterprises. If the moneys taken from all taxpayers are to be used by the Federal Government, at many points throughout the country, to erect duplicate and competing electric plants and facilities and make the taxpayers pay the cost of destroying these large existing investments, the widespread unsettlement of conditions will prevent private industry from making its contribution to National recovery.

Such menacing conditions seem to me to call for immediate consideration whether the destructive acts of government are authorized by existing laws and whether such laws are a valid exercise of the powers delegated by the people to the Congress. The Edison Electric Institute may well initiate such a review of legality.

Accordingly, I have the honor to ask that each of you render to me, as President of the Institute, your opinion and advice as to the following matters now vitally affecting the integrity of investments and the continuance of private ownership of industry:

1. Was the enactment of the Tennessee Valley Authority Act of 1933 (May 18, 1933; c. 32—1, 48 Stat. 58) within the constitutional powers of the Congress; and are the program, acts and policies of the Tennessee Valley Authority, in the items hereinafter enumerated, to be deemed to be within the authority delegated by the Tennessee Valley Authority Act of 1933?

2. Were the Executive Order issued by The President on December 19, 1933, creating the Electric Home and Farm Authority, Inc., and the subsequent incorporation of that Authority as a Delaware corporation to carry out its indicated purposes of merchandising appliances, etc., in competition with private stores and dealers in the States of Tennessee, Alabama and elsewhere, (I) within the authority undertaken to be delegated by the Tennessee Valley Authority Act of 1933; and (II) if so delegated, was such delegation within the constitutional powers possessed by the Congress?

3. Does the Congress have the power, under the Constitution, to divert public funds by loan and gift for the construction of proprietary activities that are purely intrastate, such as loans and gifts to municipalities to enable the latter to erect plants and systems for the intrastate generation and distribution of electrical energy, in competition with existing intrastate properties that are privately owned, of adequate capacity, and subject to State regulation, taxation and control?

4. Does Title II of the National Industrial Recovery Act make a valid delegation of power to The President and/or to The Federal Emergency Administration of Public Works (Executive Order No. 6252—August 19, 1933), to use Federal funds to build, own and operate dams, hydro-generating stations, transmission lines, etc., where no purpose in relation to navigation or flood control is claimed and the primary, if not exclusive, purpose is the generation and transmission of electrical power by the Government in competition with existing and adequate private systems, but with the funds and powers of government used to place the private enterprises at great disadvantage in such competition? Does Title II of the National Industrial Recovery Act empower The President or other officers of the Government to use Federal funds to create and build, in various parts of the country, the dams, stations, and lines to constitute an interconnected "grid" system of power generation and supply by the Federal Government, in substitution for and destruction of the existing private systems and facilities that are adequate and subject to State regulation, taxation and control?

In your consideration of the subjects comprised under the first four items above, which may for our present purposes be deemed the more immediate, I shall be glad if your opinion and advice will elucidate the following aspects, or as many of them as you may be willing and deem appropriate:

(a) Do the powers, or any of them, delegated to the Congress by the Constitution, as to National defense, control over navigable waters including flood control, and regulation of interstate and foreign commerce, sustain the authority of the Congress to enact the Tennessee Valley Authority Act of 1933 and to create the Tennessee Valley Authority thereunder?

(b) Does the Tennessee Valley Authority Act of 1933 undertake to confer authority and to serve purposes which are not within the above-stated powers of the Congress, and, if so, are there points at which the judicial power of the United States may be invoked by private citizens to confine to constitutional limits and purposes the exercise of the authority set forth in the Act?

(c) Do the powers of the Congress as a function of or incident to navigation and flood control, National defense, or regulation of interstate commerce, extend to each of the following, and is each of them within the powers delegated to the Tennessee Valley Authority by the Act of 1933:

(i) Construction, ownership and operation of hydro plants?

(ii) Erection, ownership and operation of transmission lines?

(iii) Purchase or erection, and the ownership and operation, of interstate distribution lines and systems?

(iv) Erection, ownership and operation of local transmission and distribution lines for electric service to farms?

(v) The creation, location, ownership and operation of manufacturing and other plants in general industries, in competition with existing private concerns, in order to utilize the electric power generated by the excessive capacities constructed?

(vi) The active promotion and sale of electrical merchandise and appliances, in competition with existing private stores and dealers?

(vii) The purchase, ownership, and at least intermediate operation, of electric distribution systems now privately owned, such as that in the City of Knoxville (Tennessee) and the withdrawal of such properties from State and local taxation and State regulation of rates?

(viii) The TVA "yard-stick" program, based upon the control by the Federal Government, through the TVA, of the local intrastate utility distribution of electricity, either by direct utility operations by the TVA or by subsidizing municipal ownership of local systems to distribute electricity purchased from the TVA under contracts by which the latter, in behalf of the Federal Government, controls the resale price to local consumers?

(ix) Even if the TVA plan for the generation of vast and unnecessary surpluses of energy in connection with its dams is an incidental or discretionary aspect to which the judicial power does not extend, do any valid powers of sale of such surpluses of energy end with the sale or can continuous Federal control be carried through to fixing the resale price in the local intrastate distribution by a municipal or private corporation?

(d) Do the powers of the Congress to improve the rivers, or any other powers of the Congress, authorize it to create agencies which take away or limit the police power jurisdiction of the States as to electric rates, either by construction and direct Federal operation of generating and distributing facilities not subject to State taxation or regulation, or by removing local rates to consumers from State Commission jurisdiction through contracts with municipalities or private corporations fixing the rates at which such energy may be resold intrastate?

(e) Are the present power program, acts, and announced objectives of the Tennessee Valley Authority, including the matters stated under (c) and (d) above, within the authority undertaken to be delegated to the Authority by the Tennessee Valley Authority Act of 1933?

(f) Are the provisions of the Tennessee Valley Authority Act of 1933 in any respect discriminatory to such extent as to be invalid?

(g) Are legislative powers in any respect unconstitutionally delegated to the TVA or other administrative officer contemplated by the Tennessee Valley Authority Act of 1933?

(h) On the facts, including the present capacities for producing and distributing power in the area subject to the Tennessee Valley Authority Act of 1933, are the Federal expenditures for increased and duplicated capacity for power production and transmission by the TVA in that area so profligate an expenditure of public funds as to sustain any manner of suit to restrain them —whether in behalf of a taxpayer or other possible party in interest?

Very truly yours,

THOMAS N. McCARTER,
President.

General Observations

The introduction of the reply to President McCarter's letter and a portion of the section of the Opinion headed "General Observations" are reproduced herewith, followed by the conclusions arrived at by Messrs. Baker and Beck:

November 22, 1934.

MR. THOMAS N. McCARTER,
President, Edison Electric Institute,
80 Park Place,
Newark, New Jersey.

DEAR MR. McCARTER:

Under date of October 25, 1934, the Edison Electric Institute, through you as its president, submitted to us for our opinion certain questions of law, and you suggested that you would be glad to have us direct our attention first to the first question submitted. We examined the question independently and in conference found our minds in agreement. We, therefore, submit herewith our joint opinion.

As all of the questions submitted concern the powers of the Federal Government and the reserved powers of the States we think certain general observations important.

GENERAL OBSERVATIONS

* * *

The question of the extent to which the *Federal Government* may go in entering upon and conducting a business ordinarily carried on by citizens or corporations under authority of the States, or by the states themselves, is a momentous one. It goes to the very heart of the distinction, under our form of government, between the federal system with its limited and enumerated powers, and the state system with its unlimited powers (except as expressly prohibited by the Constitution). For the Federal power, being supreme within its sphere of action, and having the right to prevent any interference or competition by the states, may thus exclude the action of the state within whose territory it operates and destroy the state's sovereignty.

Nor can the importance of the question be brushed aside by saying that it has long since been settled by some sweeping decision or decisions of the highest court interpreting the Constitution; for there are no such decisions, and the question is an open one. Indeed, as said by Chief Justice Marshall in McCulloch v. Maryland, "The question respecting the extent of the powers (of the Federal Government) actually

granted is perpetually arising and *will probably continue to arise as long as our system shall exist.*"

We come then to this question: Can the Federal Government having the undoubted power to construct dams on navigable streams, make use of these dams to go into the hydroelectric power business, supplying states, cities and individuals with electricity to the displacement of private corporations performing this service, even to the displacement of municipalities and the states themselves, which may have the right and the opportunity to supply such service? Is the answer complete and conclusive which points out that the dam to control floods and promote navigation is also very conveniently used for the production of electric power, and that it is a waste not to use it so? Or, if this is not sufficient, is it made so when there is added to it the answer that the plant is already on hand, even though only partially completed, having been constructed under the undoubted power of the government for war purposes?

These are the broad questions which underlie the determination of the constitutionality of the enactment by Congress of a plan for the utilization and development of Muscle Shoals and the expanding of this plan into a utilization of the entire Tennessee River for the extensive development of the Tennessee Valley by the furnishing, on the part of Government of the United States, of a great hydroelectric power system.

* * *

(The main body of the Opinion, not reproduced here, follows the foregoing. —Ed.) The conclusion reads:

Conclusion to the Opinion

It should be borne in mind that the Tennessee Valley Authority Act of 1933 is not an emergency, temporary or relief measure. It is permanent legislation which undertakes to declare a permanent policy supposed to be within the normal constitutional power of Congress.

Assuming the soundness of the conclusions reached in the foregoing memorandum, the answers to the questions and sub-questions submitted may be categorically stated as follows:

1. The enactment of the Tennessee Valley Authority Act of 1933 was not within the constitutional powers of the Congress.

2. The program, acts and policies of the Tennessee Valley Authority are not within the terms of the Tennessee Valley Authority Act of 1933 in the following respects:

   (a) The Act does not authorize the acquisition and operation of electrical distribution plants.

   (b) The regulation of local utility rates in the area occupied by TVA is only authorized in the case of sales to municipal plants to the extent of preventing discrimination, but in the case of sales to privately owned utilities full power of regulation is sought to be granted.

   (c) The Act does not authorize the activities of the Electric Home & Farm Authority, Inc.; and the EHFA would seem to be predicated upon the National Recovery Act.

3. The other elements of the program, acts and policies of TVA are in terms within the Tennessee Valley Authority Act.

The foregoing questions are in answer to the main question quoted at the beginning of this memorandum. The subsidiary questions submitted by the letter of the Edison Electric Institute so far as they are applicable to the main question No. 1 quoted at the opening of this memorandum are answered categorically below upon the basis of the conclusions reached in the memorandum.

1. Neither the power to regulate interstate commerce (including specifically powers over navigation and flood control), nor any of the war powers (generally designated as national defense), nor the power to dispose of government property, sustain the authority of the Congress to enact the Tennessee Valley Authority Act of 1933 and to create the Tennessee Valley Authority thereunder.

2. A consideration of how private citizens may invoke the judicial power to prevent unconstitutional action under the Tennessee Valley Authority Act of 1933 have been reserved for a separate memorandum.

3. The next sub-question is "whether the powers of the Congress as a function of or incident to navigation and flood control, national defense, or regulation of interstate commerce, extend to each of the following and is each of them within the powers delegated to the Tennessee Valley Authority Act of 1933?"

(a) The construction, ownership and operation of hydro plants is within the powers delegated to TVA. The construction, ownership and operation of hydro plants is at most within the foregoing powers of Congress only to the extent that they are necessary for and operated to utilize the surplus power which *is necessarily and incidentally* produced in the construction of a *bona fide* navigation or flood control project; and it is contended by some, including New York State Authorities, that the Federal Government cannot even claim such incident surplus power as against the State.

(b) The erection, ownership and operation of transmission lines is within the powers delegated to the Tennessee Valley Authority by the Act of 1933. The erection, ownership and operation of transmission lines is not within the powers of the Congress under any of the foregoing constitutional powers unless it be to an extremely limited extent for the purpose of leasing or selling wholesale surplus power necessarily and incidentally produced by *bona fide* navigation and flood control projects as aforesaid.

(c) The purchase or erection, ownership and operation of intrastate distribution lines and systems is not within the powers conferred upon TVA by the Act, and it is not within the constitutional powers of the Congress.

(d) The erection, ownership and operation of local transmission lines for electric service to farms is within the powers delegated to TVA by the Act, but it is not within the constitutional powers of the Congress. The reference to distribution lines for electric service to farms is not clear, but they are not authorized by the Act nor within the constitutional power of the Congress.

(e) The creation, location, ownership and operation of manufacturing and other plants in general industries in competition with existing private concerns, in order to utilize the electric power generated by the excessive capacities constructed is not within the powers delegated to TVA by the Act, except as to the ownership and operation of the existing nitrate plant for fertilizer; and it is not within the constitutional power of the Congress under any of the functions enumerated or otherwise.

(f) The active promotion and sale of electrical merchandise and appliances in connection with existing private stores and dealers is not within

the powers delegated to TVA by the Act and is not within the constitutional powers of the Congress. However, as stated in the memorandum, this should be more particularly considered in connection with the questions dealing with the National Industrial Recovery Act.

(g) The purchase, ownership and at least intermediate operation of electrical distribution systems now privately owned, such as that in the City of Knoxville, is not within the powers delegated to TVA by the Act and is not within the constitutional powers of the Congress. Hence, the question whether in the event of such purchase, ownership and operation the properties would be validly withdrawn from State and local taxation and regulation does not arise. However, if such property could be validly acquired by TVA, it would be exempt from State and local taxation and regulation under the terms of the Act, but since TVA would be acting in a proprietary and not a governmental capacity, the Congress would not have the constitutional power to exempt the property from State and local taxation or State regulation.

(h) The control of retail selling prices where TVA sells to private utilities and control to the extent of preventing discrimination where TVA sells to publicly owned utilities is within the powers delegated to TVA by the Act; but it is beyond the constitutional power of the Congress to control local utility rates and service either directly or through contracts sought to be made by a corporation created by the Congress.

(i) Even if the TVA plan "for the generation of vast and unnecessary surpluses of energy in connection with these dams is an incidental or discretionary aspect to which the judicial power does not extend," any valid powers of sale of such surpluses of energy and with the sale to the local distributing company and the resale price in the local intrastate distribution by a municipal or private corporation cannot be Federally controlled.

4. Congress has no constitutional power to create an agency which will take away or limit the police power of the States to regulate rates either by the construction and direct Federal operation of generating and distributing facilities not subject to State taxation or regulation or by a system of contracts with municipalities or private corporations fixing the rates at which the power is to be sold intrastate.

5. The extent to which the present power program, acts and announced objectives of TVA fall within the powers delegated to the TVA by the Act has been stated in a previous answer.

6. To the extent, if at all, that the regulation of rates might be sustained as a regulation of interstate commerce, the regulation is so discriminatory as to be invalid.

7. There is good reason to believe that the TVA Act is so general in its terms as to amount to an unconstitutional delegation of legislative power, but the prohibition against the delegation of legislative power is so difficult of application that it cannot be relied upon with great confidence.

8. The question of the persons by whom and the manner in which unconstitutional expenditures and other unconstitutional actions by TVA may be challenged in judicial proceedings is reserved for a separate memorandum. However, with reference to the query whether a taxpayer's proceeding might be sustained, it would seem that *Frothingham v. Mellon* (Companion Case of *Massachusetts v. Mellon*), 262 U. S. 447, 486-9, would foreclose the possibility of maintaining a taxpayer's suit to enjoin an illegal expenditure of Federal money.

(Signed) JAMES M. BECK,
(Signed) NEWTON D. BAKER.

UTAH COMPANY ACCLAIMED FOR OUTSTANDING PUBLIC SERVICE

The Utah Power & Light Company has been commended highly for outstanding public service in 1934 in alleviating disastrous drought ravages in its territory and saving agriculturists from complete ruin.

In a report made recently to Governor Henry H. Blood, the Governor's Bear River water committee estimated nearly $4,000,000 in crop values had been saved farmers by releasing Bear Lake water into Bear River through dredging operations. In Utah, the report states, 88,224 acres of land received water and yielded $3,149,811 additional crops over what would have been produced. In Idaho 62,001 acres benefited to the extent of $683,095.

To provide the water the power company removed 90,000 cubic yards of earth in deepening the channel at a cost of $45,000 at its Lifton pumping plant on Bear Lake.

So appreciative of the action of the company was the committee that its chairman, Frederick J. Champ, referred specifically to "the constructive and helpful attitude of the Utah Power & Light Company, the cooperation of which has made possible delivery of a large portion of the water distributed under this emergency program."

"The entire Bear River system of the company," he said, "has been conscientiously devoted throughout the season from the pumps at Bear River to the dam at Cutler, to irrigation purposes in preference to power development, and its personnel has been continuously at the command of this committee in carrying out the details of this program in conformity with action taken by the water users themselves."

The power company also was praised for its helpfulness in the Salt Lake City water program during the year and the realization of the Pine View dam project in Ogden canyon.

"The prompt and efficient work your men have done for us this past summer in connecting our new wells has been of greatest help," City Commissioner George D. Keyser wrote in a letter to George M. Gadsby, president of the company. "We have not been delayed by the power company on any installation and your men have taken a personal interest at all times."

Ora A. Bundy, president of Ogden River Water Users' Association, speaking at the ground breaking ceremonies of the Pine View project, took occasion to laud the power company for its useful service in making the undertaking a reality and aiding in supplying specifications and other helpful data. The $3,000,000 reclamation project will provide storage for 38,000 acre feet of water.

The activity of the power company was actuated by a realization that community building and territorial welfare are the foundation upon which a public utility builds, said Dr. Adam S. Bennion, assistant to the president.

CONSOLIDATED GAS COMPANY CELEBRATES FIFTIETH ANNIVERSARY

The Consolidated Gas Company of New York, parent company of the largest group of gas and electric operating utilities in the world, reached its fiftieth birthday on Saturday, November 10. On that date fifty years ago six gas companies, operating in New York, were merged into one organization bearing the present name of the company. One of the original organizations, the New York Gas Light Company, was the first gas company in the city, and the second in the country. It was organized in 1823.

The Company commemorated its fifty years of public service on Thursday, November 15, with the unveiling of a bronze tablet in its general office building at 4 Irving Place. George B. Cortelyou, President of the Company, presided. Among the 400 persons attending the exercises were representatives of the utility industry, prominent business men, and the officers and department heads of the companies in the Consolidated Gas Company System.

Speeches were made by Mr. Cortelyou, who has served twenty-five years as President of the Company; Frank W. Smith, President of The New York Edison Company, who has a service record of more than fifty years with the electric companies in the city; Floyd L. Carlisle, Chairman of the Board; and John E. Zimmermann, President of the United Gas Improvement Company of Philadelphia, which celebrated its fiftieth anniversary in 1932.

Frank W. Smith unveiled the bronze plaque and explained its significance.

In his address Mr. Cortelyou said that the Consolidated Gas Company came into being as a result of the need for a strong and unified organization to replace the several relatively small concerns whose resources had been seriously impaired by destructive competition with one another growing out of their conflicting and overlapping franchises. To unite them and harmonize their differences not only preserved their solvency but enabled them to give better service. Mr. Cortelyou stated that time had completely vindicated the wisdom of far-sighted leaders who brought about this consolidation and later the amalgamation of the electric and steam companies.

Mr. Cortelyou presented figures indicating the remarkable growth of utility service in New York:

Population served: 1884, 1,165,000	1934. 7,500,000
Gas sold: 1884, 5,000,000,000 cu. ft.	1933, 39,000,000,000 cu. ft.
Electricity sold: 1884, (est.) 2,300,000 kwhr.	1933, 4,228,000,000 kwhr.
Steam sold: 1884, 200,000,000 pounds	1933, 11,434,000,000 pounds
Number of stockholders: 1885, 2,138	1934, 119,189
Number of employees: 1884, 1000	1934, more than 45,000
Total assets: 1884, $39,000,000	1933, $1,350,000,000
Taxes: 1884, $879,000	1933, $36,375,000

Mr. Cortelyou said:

"These are striking figures considered merely as figures; but it is when we look behind them to see what they mean in terms of human welfare that we are impressed with their real significance. It is I believe a fair statement that the remarkable growth of the companies in the output and use of their products could not have occurred unless these products were produced and sold at prices that enabled the people to profit by their use. Gas displaced candles and whale oil for lighting because it was a superior product and rendered a superior service; otherwise it would not have been used. And the same is true of electricity when it, in turn, displaced gas for lighting. It applies, likewise, to gas, electricity and steam when they displaced other fuels for a wide range of heating and power purposes. The extensive and increasing use of a product over a long period of time means that both buyer and seller profit. Unless benefits are conferred as well as received, and unless these are in fair balance, no business can gain and hold public acceptance as the utility industry has done."

The bronze plaque symbolizing fifty years of service to New York

Mr. Zimmermann congratulated the Consolidated Gas Company on its honorable career and pointed out that it was impossible to overestimate the share this company has had in the tremendous development of the New York metropolitan area during the past 50 years. Mr. Zimmermann commented upon the wide-spread competition now being threatened by the federal government and the nation-wide drive to have the user's dollar buy more and more electricity despite the fact that costs have been increased greatly. Mr. Zimmermann felicitated the company on the 50th anniversary and in particular upon its good fortune to have as president Mr. Cortelyou.

Mr. Carlisle pointed out that measured by the tests of revolutionizing work, business or social usefulness, light, heat and power have largely created the modern world. The Consolidated Gas Company perfected and made available to the people of New York City these great services. This has been done with private capital, without government aid or subsidy and private initiative has no finer record. He also stated that the usefulness of any company can be measured no less by the service it renders than by what it is doing for those who are employed by it, and the Consolidated Gas Company, measured by both yardsticks, has an enviable record. It is now a corporation that is fighting for its financial integrity and for the security of the jobs and payrolls of the men and women working for it; fighting for no more than a fair and honest return to the people who have

(Continued on page 393)

THE ELECTRICAL INDUSTRY AND THE NATIONAL ELECTRICAL CODE

By ALEXANDER MAXWELL
Director of Engineering, Edison Electric Institute

Sometimes it has appeared to be difficult for those not thoroughly familiar with the situation to understand why such a seemingly matter-of-fact and inconspicuous document as the National Electrical Code should be the subject of so much concern. Most people in the electrical industry know that there is such a document and that in some vague way it operates to insure that electrical wiring shall not cause fire or other damage. This seems reasonable enough, as indeed it would be, and the existence of any closer or more important connection with the main problems of the electric light and power business has not always been apparent from this casual estimate of the situation.

This is not the actual state of affairs, however, and it will presently be shown that this code affects the fortunes of electric utilities in a direct and important way; but first it may be worth while to see how this somewhat casual attitude, on the part of electric utility people and some others, came about. The reason is not difficult to find, for it is contained in the deeply rooted tradition that this code is solely a kind of hand-book or guide for the use of electrical inspectors—those whose business it is to inspect electrical installations in consumers' premises, sometimes on behalf of the insurance underwriters who carry risks upon the premises, and sometimes on behalf of local authorities in the interest of public safety.

Of course the National Electrical Code is an inspector's hand-book, and it is quite clear that such an instrument and such a use is necessary and desirable if inspections are to be performed. It may even be that at one time this code was no more than this, but it is certainly much more than this today. For at the present time and for a good many years past the National Electrical Code has been effectively the instrumentality by which the technical methods, the materials and the costs of interior wiring have been controlled, and thereby the rate of development of the consumer use of electrical energy has been controlled to a substantial degree.

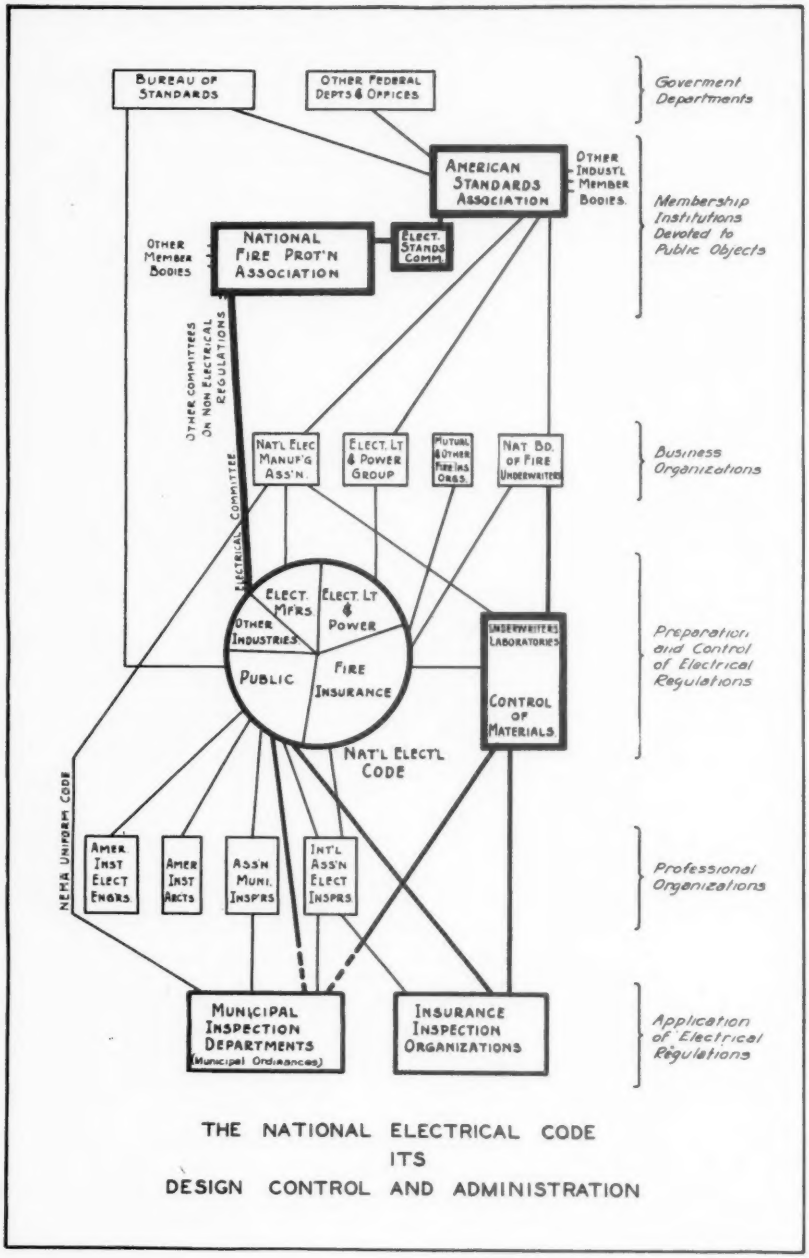
It is not the purpose of this article to discuss the economics of wiring or the rather conspicuous retardation of development in that field, or even the critical importance of the complementary relation between the consumer's electric plant, which is his wiring installation and its equipment, and the power-generating and distributing facilities of the utility that supplies him. These matters are obvious enough and at any rate they have been amply dealt with elsewhere. It is the object here to point out that this National Electrical Code does exercise, under existing conditions, an almost complete authority over technology and costs in this field and therefore over a substantial part of the total business of the electrical industry as represented by utilities, manufacturers, contractors and others. This would be an important fact and worthy of serious consideration, even if the influence of the code had been uniformly beneficial to the electrical industry, and therefore it is not necessary here to discuss whether it has been beneficial, or if not, in what ways it has been deficient.

Under these circumstances it will be seen that the theory that the code is solely an inspector's document is untenable. Actually the code has two important attributes; one of these is that described above which is that of an important basic standard of principal importance to the electrical industry and of only incidental importance to underwriters and public authorities, since it is reasonable to suppose that the entire electrical industry would not advocate or follow practices that were unsafe, from purely selfish reasons if not from any better ones. The other attribute of the code is that of the inspector's guide, and in this there does reside the necessity for rules that will provide against shoddy and unworkmanlike practices, that will give effect to the design principles established by the basic rules, etc., all in terms suitable for practical application in the field.

In view of the fact that electrical inspectors are jealous of their prerogative in code-making, which, they represent, is based upon their first-hand acquaintance with problems encountered in the field and with the kinds of rules that are most usable for them, it should be made plain that there is no known intention, upon the part of anyone who has considered the subject so far, to impair the inspectors' reasonable intention to have the sort of field rules that may be most useful to them. There has been plenty of criticism to the effect that these rules need a major operation in an editorial way, but this, after all, is a matter of opinion. The fundamental thing to be borne in mind is that this viewpoint—that the code is merely an instrument for inspectors—is only a part of the story, and on the other hand, there is the inevitable effect of the code upon the industry that supports it.

The relative importance of these two distinct functions of the National Electrical Code is a pertinent subject for inquiry, but it is not a very easy one, for the reason that every group concerned is inclined to think, not unnaturally, that its interest is of paramount importance. This may be inevitable, but it is particularly unfortunate because there is common ground available to all in the principle that the sole purpose of the code, no matter in what way it operates, is to govern the fire or other hazards associated with interior wiring with the minimum possible effect upon industry. One way to estimate this relation may be through the amounts of money affected by each of its functions.

As an electrical industry standard, the National Electrical Code governs a fraction of, and affects in a measurable way, an annual business of approximately four billions of dollars. This figure comprises in normal times, say, one and three-quarter billions gross revenue of utilities, one and one-quarter billions of electrical manufactured products and the remainder in capital construction, fuels, freights, and raw materials, besides the minor branches of the electrical industry. The precise degree by which this annual business may be affected by the provisions of this code is a subject beyond the scope of this article



THE NATIONAL ELECTRICAL CODE
ITS
DESIGN CONTROL AND ADMINISTRATION

Fig. 1

It is sufficient to say that it is definite and substantial and that if it were as little as one per cent it would still account for an annual sum of $40,000,000.

As a preventive of damage due to electrical hazards, for direct field application by inspectors and local authorities—that is to say, the aspect of the code with which inspectors are particularly concerned, the National Electrical Code deals with an annual loss stated by the National Board of Fire Underwriters to be $14,000,000 average for the five-year period including the year 1933. As in the previous case, it is not necessary to attempt a great degree of refinement to set a precise figure for the degree to which this figure may be affected by the provisions of the code. Certain considerations are quite well known and generally conceded by all concerned. One is that the fires reported to be of electrical origin very materially exceed those which are found actually to be electrical upon investigation. Another is that a substantial amount of electrical fire loss occurs in risks outside the purview of this code, and not concerning the electric light and power industry at all. A third, and most important, is that a large proportion of all losses occur due to bad workmanship or deliberate violation of fundamental rules, that is to say in spite of this code or any code.

Taking all of these factors into account, it appears to be generous to estimate that one-third of the reported fire loss, or, in round numbers, $5,000,000 annually, may be amenable to the provisions of the code. Of this amount it seems reasonable to estimate that the effect of conceivable changes in code provisions, that is to say, the effect on fire losses for the range between the most liberal and the most rigorous code provisions that have been proposed by anyone in recent years, might possibly be of the order of 10 per cent at the utmost, which gives a final figure of $500,000 annually.

It will be seen from the foregoing that, for a general survey of this situation, a close estimate serves very little purpose, since the disparity between the two amounts is so great. The purpose here has been merely to show that the National Electrical Code is of a dual nature, and that of these the one most emphasized is the lesser one in total economic effect.

These considerations are brought up because the electric light and power industry has been concerned in recent years with the trend toward more and more industry legislation through the instrumentality of the code, wherein it appeared that the interests, not only of utilities but of the electrical industry generally, were being obscured in a fog of meticulous regulations which were not extremely important even where they were meritorious. This cause for apprehension appears, among many others, particularly in the complex structure of committees and similar bodies concerned with the formulation of the code, and in the extremely disadvantageous editorial form of the existing code. Both of these, of course, are due to many years of development when no particular attention was paid to these matters.

With regard to the first of these, it may be interesting to refer to the diagram reproduced in Figure 1. This diagram, which was prepared by Mr. George E. Miller of Cleveland shows the complexity of the administrative structure for the code, and particularly the relatively minor role assigned to the electric light and power industry in its preparation compared with the degree in which this code may affect the fortunes

of the industry. The same thing might be said for the entire electrical industry, for that matter, in view of the influence of the code upon it. The reason for this situation is, of course, that the code has been administered as though only one of its functions—that of the inspectors' guide—existed. The other aspect, as an electrical industry standard, has grown up so gradually that it has never been squarely taken into account.

As to the second of these considerations, the editorial form of the code, the electric light and power industry has recently made vigorous representations, including a specific proposal for a thorough going revision. The essential criticism of the existing form is, again, that all of the provisions of the code, including those that vitally affect engineering and design in the art, and the costs of wiring, are dealt with in the form of rules for the use of inspectors in the field, with the result that few, if any, say plainly what they mean in their fundamental application and that questions of primary importance for design and costs are debated, and too often decided, on the same basis.

Reduced to its essentials, the proposal recently made by the electric light and power industry to the committee in immediate charge of the National Electrical Code amounted to a suggestion that the aspect of the National Electrical Code as a code governing parts of the electrical industry should be recognized and should be differentiated from the function of the code as a handbook for inspectors. It was further proposed, of course, that with the recognition of this situation suitable provision should be made for developing the code in its two capacities so that it would more reasonably fulfill both functions. After all, this only amounted to a proposal that the basic provisions in the code, which are the ones that affect the electrical industry, should be segregated from details of application and put into a form suitable for their purpose. There never has been any suggestion that the kind of regulations suitable or necessary for the application of the code in the field should not be provided in a manner satisfactory to the enforcing authorities concerned and in such form as their experience has shown to be desirable. Naturally it is expected that a clear exposition of the basic rules affecting the industry will have the effect of clarifying and making possible a more orderly arrangement of these details of application, but this is a matter that can only be proved by experience.

Pennsylvania's 57 New Streamlined Locomotives Will Be World's Most Powerful Electrics

Orders for 57 streamlined electric engines, to be the most powerful electric passenger locomotives ever built in the world, have been placed by the Pennsylvania Railroad in one of the largest locomotive equipment orders in the history of American railroading.

Costing almost $15,000,000, the Pennsylvania's new giant electrics have been specially designed for the railroad's high-speed passenger service to be inaugurated between New York, Philadelphia, Baltimore, and Washington early in 1935. They will be capable of making a regular operating speed of 90 miles per hour, and will haul trains of standard size and length. Twelve 57-inch driving wheels, six on each side, will drive the fully streamlined, articulated engines along the tracks with full power of 4620 horsepower at high speed.

Grace and symmetry will mark every line of the new electric engines. Each end of the locomotive will slope gently inward from the floor to the cab roof, with rounded shoulders running toward the central operating compartment. The engineman's control position will be at the center of the cab, giving unobstructed view of the track and making possible a design of the cab extremely pleasing to the eye. More than 4,200,000 man-hours of work in railroad shops and in shops of the electrical and equipment companies are represented in the locomotive orders. It is expected that the work will be gotten under way immediately, and that the engines will be delivered, ready for service, early next year. The purchase is being financed by the Public Works Administration, and is part of the Pennsylvania's $77,000,000 improvement and equipment program involving the New York - Washington roadway electrification, and car and locomotive construction financed by the government.

Eighteen complete chassis will be built at the Pennsylvania's Altoona shops, and that works also will apply the electric propulsion and control apparatus to chassis of 25 additional engines.

Twenty-five chassis, to be equipped at Altoona, will be built at the Baldwin Locomotive Works at Eddystone, Pa.

The General Electric Company at Erie, Pa., will build 14 complete locomotives, and the electric propulsion and control apparatus for nine additional engines.

The Westinghouse Electric and Manufacturing Company at Pittsburgh, Pa., will build the electric propulsion and control apparatus for 34 locomotives.

Each locomotive will cost in the neighborhood of $250,000.

The Pennsylvania's new passenger engines will be 79½ feet long, of all-steel construction, and will weigh 460,000 pounds. Each will operate on an 11,000-volt, 25-cycle, single-phase system, the current to be fed by overhead wires through a pantograph. The maximum starting tractive effort will be 72,800 pounds.

Two main frames, each resting on six driving wheels and a four-wheel engine truck joined by an articulated or hinged joint, will support the body of the locomotive. Power will be furnished by six pairs of twin traction motors, each pair attached to a driving axle. Power will be transmitted to the driving wheels through quill-mounted gears, permitting the free spring play of axles and wheels.

The new engines will form part of the Pennsylvania's fleet of more than 150 electric locomotives designed especially for the New York-Washington passenger and freight service. This is the second extensive locomotive order placed by the Pennsylvania Railroad in recent months. In July, 28 electric passenger engines were ordered at a cost of over $6,000,000; work on these locomotives is progressing rapidly and they will be placed in service in the near future.

Fiftieth Anniversary of Consolidated Gas Co.

(Continued from page 390)

invested their savings in the enterprise; fighting to maintain a high quality of service and, above all, fighting to have the truth prevail.

Following the exercises, luncheon was served in the company restaurant. Fourteen men of the affiliated companies, who have served fifty years or more, were guests of honor. They are John J. Flynn, M. M. Graham, Charles H. Hamilton, Richard Kennellie, F. J. Lambrecht, William Long, Andrew J. Michell, Richard Powers, Charles Roller, Sr., and Richard Shepard, all of the Consolidated Gas Company; Frank W. Smith and Edward A. Harley of the New York Edison Company; Henry Franz of the New York Steam Company, and Benjamin F. Rush of the Brooklyn Edison Company.

RECENT PUBLICATIONS OF THE INSTITUTE

Pub. No.		*Date Issued*	*Price to Members*	*Price to Non-Members*	*Price to Foreign Countries*
B1	Electric Service for Oil and Gasoline Pipe Line Pumping	(3/34)	$0.10	$0.25	$0.30
B2	Air Conditioning—1934	(5/34)	.75	1.85	2.00
B3	Condensers, Feed Water Heaters, Evaporators and Boiler Feed Pumps—1934	(6/34)	.45	1.15	1.25
B4	Turbines—1934	(6/34)	.40	1.00	1.10
B5	Station Piping—1934	(7/34)	.60	1.50	1.60
B7	Oil and Gas Engines—1934	(8/34)	.40	1.00	1.10
B8	Steam Generation	(8/34)	.60	1.50	1.60
B9	The Electric Light and Power Industry in 1933	(10/34)	.30	.75	.85
B10	Electrical Energy Diversion	(10/34)	.20	.50	.55
B11	Cable Operation		In preparation		
A1	The Electric Light and Power Industry, 1932	(8/33)	.30	.75	.85
A2	Station Piping	(8/33)	.60	1.50	1.60
A3	Turbines	(8/33)	.75	1.85	2.00
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A9	A-C Networks Operation—1931	(7/33)	.20	.50	.60
A10	Cable Operation—1932	(8/33)	.45	1.15	1.25
A11	Load Area Development	(7/33)	.30	.75	.85
A12	Fault Locating Methods Used on Underground Cable Systems	(7/33)	.40	1.00	1.10
A13	Power System Wave Shape	(7/33)	.20	.50	.60
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A17	Promotion of Home Air Conditioning	(8/33)	.20	.50	.60
A18	Economic Design of Hydro-Electric Plants	(8/33)	.20	.50	.60
A19	Hydraulic Governors	(8/33)	.20	.50	.60

In addition to the above publications, the following committee reports have been published in the EDISON ELECTRIC INSTITUTE BULLETIN. Single copies of the BULLETIN are priced at 25c.

Lamp Sales in 1932—*August, 1933, issue.*
Suggested Standard Packages for Overhead Lines Material—*August, 1933, issue.*
Power System Interconnection—*September, 1933, issue.*
Hydrogen Cooled and Outdoor Air Cooled Rotating Machinery—*September, 1933, issue.*
Foreign Practice on Arcing-Ground Suppressors—*September, 1933, issue.*
Foreign Practice on Insulating Oils in Transformers and Oil Circuit Breakers—*September, 1933, issue.*
1933 Progress Report on Operating Experience with Reclosing Circuit Breakers—*December, 1933, issue.*
U.R.C. Type Weatherproof Wire for Overhead Conductors—*January, 1934, issue.*
Electric Service for Oil and Gasoline Pipe Line Pumping—*February, 1934, issue.*
Damage to Wood Poles and Cross Arms Caused by Lightning—*February, 1934, issue.*
Interchangeable Cable Entrances for Underground Transformers—*February, 1934, issue.*
Status of Meter Mounting Development—*February, 1934, issue.*
Bibliography of Commercial Cooking and Baking Articles—*February, 1934, issue.*
Rates Lowered on Machinery Insurance for Public Utilities—*March, 1934, issue.*
Power Station Building Costs—*May, 1934, issue.*

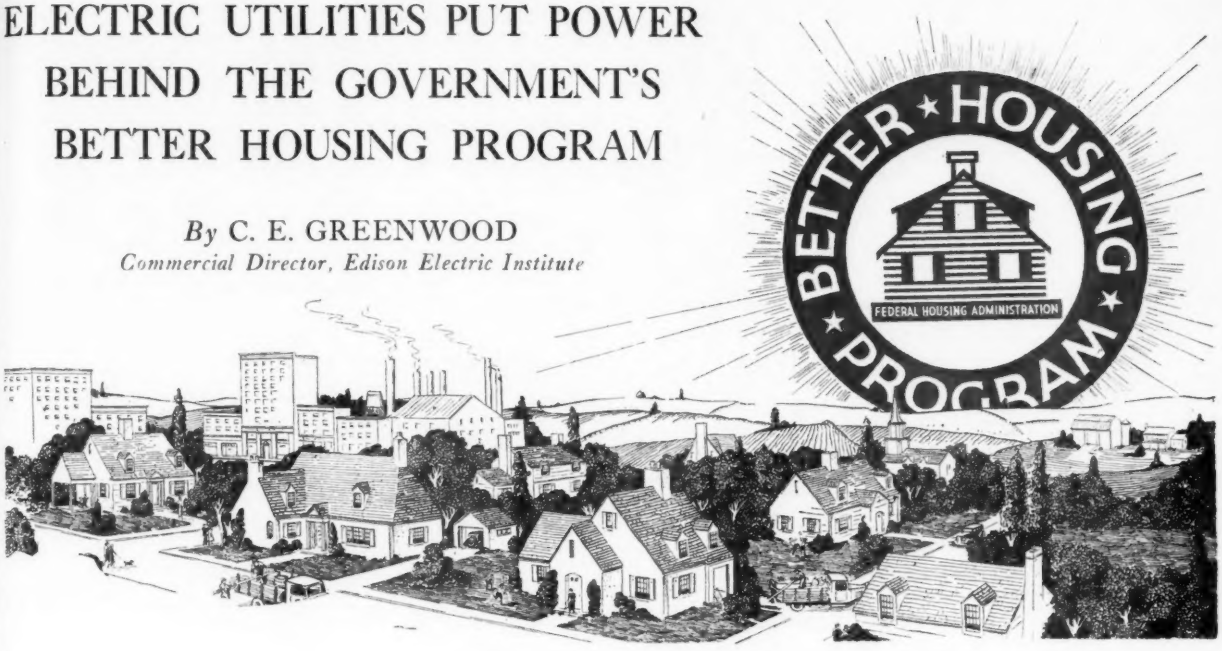
The prices include mailing charges. Member prices apply to employees of company members of the Institute. Please send money order or check with order. Orders should be addressed to—

EDISON ELECTRIC INSTITUTE
420 Lexington Avenue, New York, N. Y.

The Institute has in stock a limited number of reports prepared by Engineering Committees of the former National Electric Light Association during the past several years. A price list will be forwarded upon request.

ELECTRIC UTILITIES PUT POWER BEHIND THE GOVERNMENT'S BETTER HOUSING PROGRAM

By C. E. GREENWOOD
Commercial Director, Edison Electric Institute



Quick to perceive the ultimate benefits to be derived from the greater use of electricity through better housing and better living, the utilities, in addition to previous efforts being made to promote the Recovery Program, have mobilized in hundreds of communities to aggressively advance the complete program of the Federal Housing Administration.

A survey of progress shows the light and power companies as one of the industries leading in contributions to the success of the Housing Program. These have been expressed in local donations to community funds, and personal service of utility representatives, and in advertising and promotion. We find here and there a utility executive as leader of the local Better Housing Campaign; many score more are serving on local committees. In addition there have been thousands of column inches of tie-in advertising in newspapers, over the name of the utility, or inserted in special Better Housing pages, and wide use of direct-by-mail material, outdoor posters and cooperative work in local modernizing exhibits. The Edison Electric Institute has maintained a representative with FHA at Washington in an advisory capacity.

A window display of Union Gas and Electric Co., Cincinnati

This spirit of help is recognized, and there is no doubt of the work of coordination broadening in dimensions.

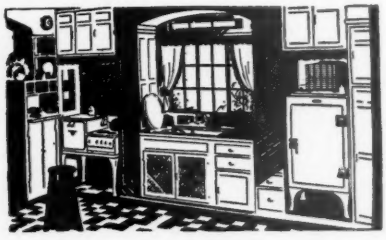
The great objectives of the Federal Housing Administration are to put back to work masses of persons who earn their livelihood in the building trades and in the building material industries who are now on the nation's relief roll; to raise housing standards, and to aid recovery by helping to end government spending on relief and to curb mounting taxes. In fact, if successful through support of private industry, it may prevent the government entering into the business of lending money for housing of any kind. These are commendable purposes which merit support of our industry.

Those familiar with the National Housing Act will recall that Title I covers the Modernization Plan, whereunder loans will be made for repairing and improvements from $100 up to $2,000, to be amortized over a maximum of three years (in special exceptions, five

A Simple MATHEMATICAL SOLUTION TO BETTER LIVING
Your Government + your Local Merchant = the dollars that will put tomorrow's kitchen in your home today
YOUR Government IS ROLLING UP ITS SLEEVES to help you live better in an All-Electric Home
STATEN ISLAND EDISON CORPORATION
Great Kills, 3970 Amboy Road Tottenville, 7515 Amboy Road
St. George, 48 Bay Street Port Richmond, 238 Richmond Ave
Make an all-electric Kitchen the cornerstone of an All-Electric Home . .
YOUR ELECTRIC COMPANY

Typical advertisements of light and power companies

Modernize Now



under the

NATIONAL HOUSING ACT

This is your opportunity, Mr. and Mrs. Home Owner, to make your home, especially your kitchen, as modern as any model home.

Under the Federal Administration Loan Plan for Home Improvements, built-in cupboards, alcoves, additional convenience outlets, modern plumbing and permanent electrical appliances can all be had with government funds at low interest charges.

Consult your bank, your contractor, or call at our local salesroom for further details on your Government's Home Improvements plan.

Pennsylvania Power & Light Company
And Your Local Dealer

MODERNIZE!

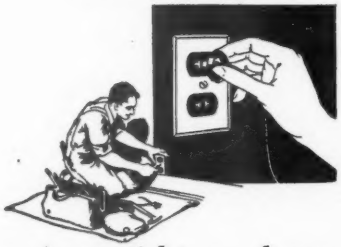
(and that means Electrify)

with

N. H. A. FUNDS

PEPCO *Electric* STORES

PROPER WIRING

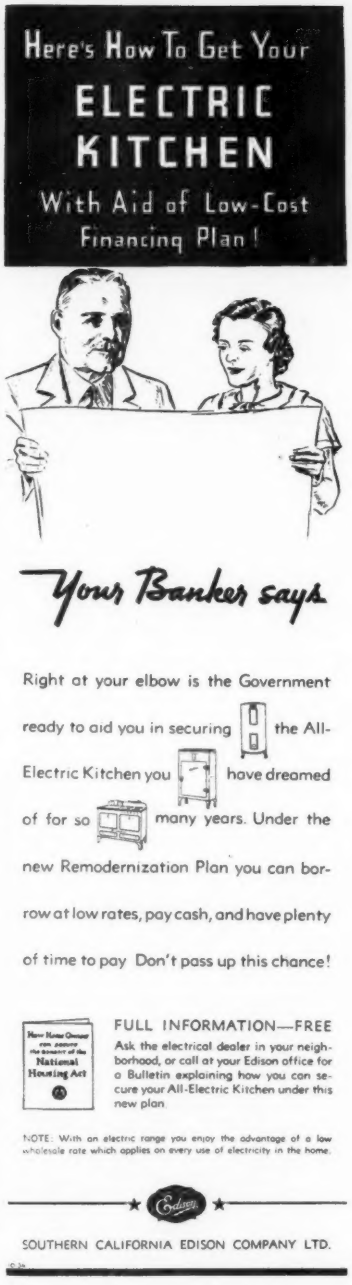


is essential to any home-modernizing program!

At The **SECOND ANNUAL ELECTRICAL SHOW**

NOW—money is available through FHA loans with which to modernize and improve your home. No home can enjoy the maximum comfort, convenience and attractiveness unless adequately and properly wired. Take advantage of the opportunity offered now by the Federal Housing administration to install those needed outlets . . . have your wiring modernized . . . put in duplex outlets!

VIRGINIA ELECTRIC AND POWER COMPANY


Here's How To Get Your
ELECTRIC
KITCHEN
With Aid of Low-Cost
Financing Plan!
Your Banker says
Right at your elbow is the Government ready to aid you in securing the All-Electric Kitchen you have dreamed of for so many years. Under the new Remodernization Plan you can borrow at low rates, pay cash, and have plenty of time to pay Don't pass up this chance!
FULL INFORMATION—FREE
Ask the electrical dealer in your neighborhood, or call at your Edison office for a Bulletin explaining how you can secure your All-Electric Kitchen under this new plan
NOTE: With an electric range you enjoy the advantage of a low wholesale rate which applies on every use of electricity in the home.
SOUTHERN CALIFORNIA EDISON COMPANY LTD.

Above, newspaper advertisement, and left, cover of a folder for distribution to consumers

years) until Jan. 1, 1936. The maximum cost to the borrower is $5 per $100 per year. The limiting condition on the borrower is that his annual payments shall not be in excess of one-fifth of his income.

Title II provides for new construction loans. It is possible to borrow up to $16,000 on an amortization basis up to 20 years, with the privilege of payment in regular periodic instalments.

Under Title III of the Act, provision is made for the establishment of National Mortgage Associations, each with a paid-up capital stock of at least $5,000,000, privately subscribed, whose business it will be to purchase insured mortgages and issue debentures against them for sale to the public.

The salient points of Title II, which is a long-range program for building homes, are the concern of every utility man interested in the installation of adequate wiring and electrical equipment. These points are as follows:

This is the first time in the history of finance that a uniform basic interest rate has been applied to private capital in the United States. Heretofore, both the legal interest rates by states as well as the prevailing rates have varied.

An opportunity is given to owners of dwellings to refinance their mortgages on more favorable terms, and to prospective owners to obtain financing on terms comparable to the payment of rent.

Mutual insurance of mortgages is offered on existing or new dwellings in amounts up to 80 per cent of appraised value, for as much as $16,000, for periods up to 20 years, and with the privilege of payment by regular periodic instalments.

Loans on such insured mortgages are to be made by lending institutions, such as banks, building and loan associations, insurance companies, and loan and trust companies, which are able to qualify as mortgagees approved by the Federal Housing Administration.

The Act authorizes variation in interest rates on insured mortgages from five per cent to six per cent. A basic maximum of five per cent other than for refunding, where five and a half per cent will apply, is fixed in the regulations.

Insurance premiums will vary from one-half of one per cent of the original face amount of the mortgage, on new financing, to one per cent per annum on refunding.

Regular periodic payments on principal will be required at a rate sufficient to pay off the mortgage at its maturity.

Only mortgages on dwellings designed for from one to four families will be eligible for insurance, except such mortgages as can qualify under Section 207 of the Act as low-cost housing projects.

It is provided in the National Housing Act that: "No mortgage shall be accepted for insurance . . . unless the Administrator finds that the project with respect to which the mortgage is executed is economically sound." Consequently, the dwellings on which mortgages are insured must be well located in urban communities.

It seems to be a logical deduction that as present property values are restored to somewhat near their original, the market will be strengthened for new home construction. Therefore the modernization phase of the National Housing Act deserves the active and sustained attention of the utility.

It will be recalled by those who have been following the Better Housing Program that all electric kitchens, built-in dishwashers, built-in ventilating fans, oil burners, permanently attached electric ranges and electric refrigerators, and lighting fixtures have been included in the list of approved equipment that are subject to insured loans under FHA. There can be no better time to direct public attention to the possibilities of

"I'LL HELP YOU IMPROVE YOUR HOME"
BETTER HOUSING PROGRAM
Your gas and electric appliance dealers are ready to supply you with those conveniences which have become the essentials of better living. This folder points out many such conveniences, and tells you how the National Better Housing Program will help you get them. These comforts you've dreamed of now may be had easily, cheaply — Why wait longer?
SAN JOAQUIN LIGHT AND POWER CORPORATION

modernization and improvement by the addition of such electrical equipment.

A most outstanding opportunity is the modernization of the home work shop through the installation of the All-Electric Kitchen. A loan can be obtained from the local bank at FHA rates and terms for this purpose, and can include, beside the range, refrigerator, water heater and dishwasher, new linoleum, cabinets, painting and the like.

The Real Property inventory which was made by CWA workers in 64 cities during the early part of the year showed that out of 2,633,135 dwelling units, there were 301,740, or 15.6 per cent, in need of major repairs. Another 857,326, or 44 per cent, are in need of minor repairs.

Of the total number but 17 per cent had mechanical refrigeration; only 4 per cent used electricity for cooking; there were 10 per cent that did not use electricity for lighting. There is room for stupendous growth.

That electric utilities have been putting the power of their support behind the Better Housing Program is evidenced by a wide range of local activities. There are illustrated here some examples of effective advertising which has been placed in the newspapers. There are still many companies that are contemplating further local support, and some further suggestions are enumerated:

1. Employee information on FHA.
   - Letter from the President.
   - Articles in employee publications.
   - Encouraging employees to make repairs.
2. Customer information—
   - Advertising in newspapers.
   - Direct-by-mail promotional pieces.
   - Participation in local exhibits.
   - FHA window displays.
3. Participation in community committees—
   - Services as members.
   - Donations to committees.
   - Stimulating interest among contractors and dealers.
4. Personal—
   - Executive leadership of local group.
   - Helping to make FHA a success.

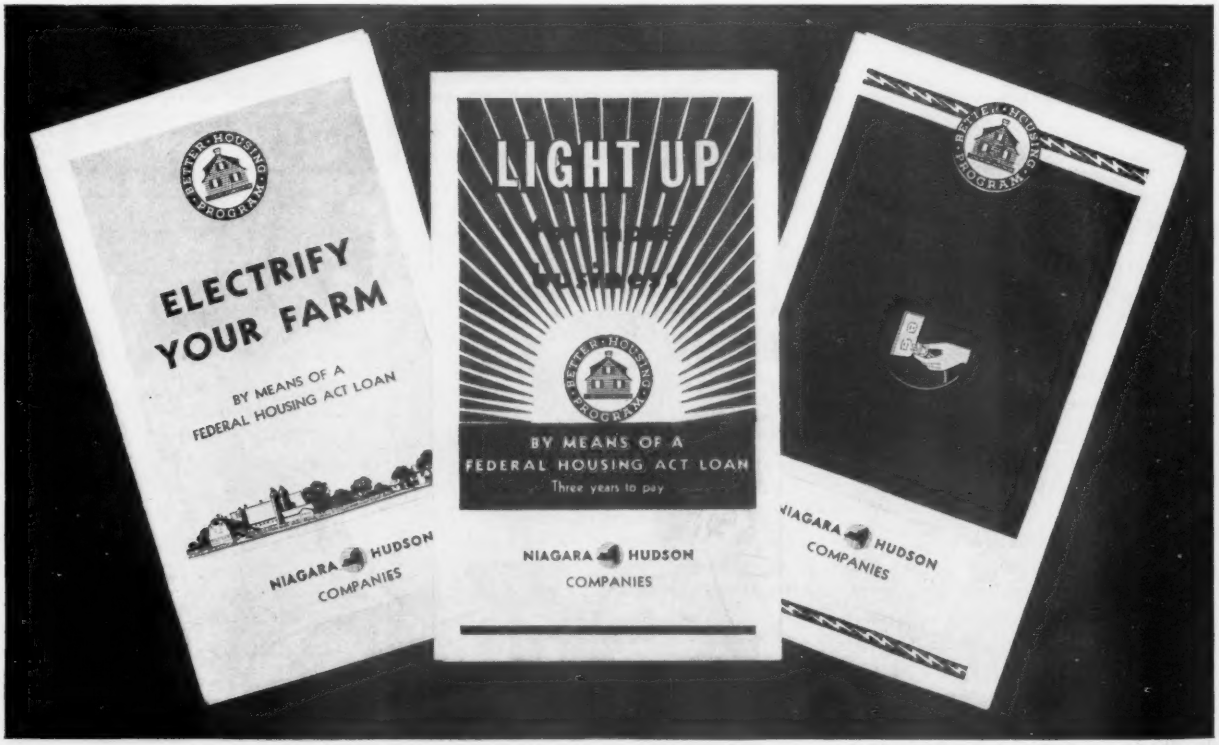
To repeat once again, the purposes of the Better Housing Program are to stop property value destruction; to increase employment, to reduce the numbers on relief rolls and to give maximum security and liquidity to housing loans.

The Federal Housing Administration expects industry to do its share of the country's modernization job. It expects that, like the man in the street, industry shall do the obviously sensible and constructive thing: build up to efficiency their own properties.

Business is being generated at the rate of between two and three millions a day. Industrialists figure that by December 31, 1935, $1,500,000,000 of new work will have been undertaken as a result of the campaign.

The average American citizen is willing to spend his money to save and improve his property. He is spending it even now, two or three millions a day. But the Modernization Campaign, which began only last August, will continue until December 31, 1935. It has, then, nearly 13 months more to go.

Our electric utilities are in a position to take leadership in the promotion of such a program. It is recognized that they are contributing to this social service for the benefit of humanity, and to help build load ultimately. These are both worthy purposes, as both contribute toward business recovery. The Federal Housing Program is also a challenge to the pride of the property owner, and there is unanimity in opinion that the United States Government is on sound ground in building such a program.


BETTER HOUSING PROGRAM
ELECTRIFY YOUR FARM
BY MEANS OF A FEDERAL HOUSING ACT LOAN
NIAGARA HUDSON COMPANIES
LIGHT UP
BY MEANS OF A FEDERAL HOUSING ACT LOAN
Three years to pay
NIAGARA HUDSON COMPANIES
NIAGARA HUDSON COMPANIES

Booklets distributed by Niagara Hudson Companies

EMPLOYEE CO-OPERATION IN APPLIANCE SALES

By H. M. SAWYER

Vice-president, American Gas and Electric Company

When a thousand persons, consisting principally of employees of the Southern Division of the Ohio Power Company with their families, recently congregated in an auditorium in Newark, Ohio, the local newspapers carried the story on the front page, for it was "news." This cheering, handclapping, enthusiastic crowd had assembled to inaugurate the President's Plan Campaign to sell electric ranges and electric water heaters. They were there to learn of the details of this latest activity of their company. They were determined to duplicate their performance in the Spring Campaign, when the Southern Division carried off the honors.

The audience included practically every man and woman of the division, except those whose duties interfered with their attendance, and sales officials from other parts of the State and the home office: George N. Tidd, president, and H. M. Sawyer, vice-president, attended from New York; Frank Espy, vice-president, and C. E. Torrey, general manager, were there together with managers and department heads of other divisions of the Ohio Power Company from all over the State. These executives and department heads took little or no part in the proceedings. They were not present to attend "just another meeting" designed to put "pep" in the employees. They attended from a deep-seated realization of the vital importance of load building activities, by reason of the company's need for increased gross in the face of ever increasing uncontrollable operating expenses such as the rapidly rising amounts of money necessary to pay their tax bill. True, they wished to demonstrate their personal interest in the success of the program, and, in addition, to secure to themselves the inspiration which such a meeting can bring to any one interested in sales promotion. They came to absorb ideas to be applied in other localities and to capture the spirit of these meetings for which Newark is famous within the organization.

The Christmas Campaign of American Gas and Electric Company subsidaries, this year, was designated "The President's Plan," and commenced simultaneously in all subsidiary companies.

In all of the recent campaigns held throughout the subsidiary companies of the American Gas and Electric system, the competitive spirit has not only been carried out among the employees, but

Sales Meeting of the Southern Division of the Ohio Power Company held at Newark, Ohio
"Accountants, line crews, metermen, power plant employees sit in the front rows at sales meetings"
At Top of Page—A view of the stage at the Newark Sales Meeting

THE PRESIDENT'S PLAN

An All Employee-

Christmas-Range & Water Heater Campaign

We've conducted sales campaigns and sales campaigns — all with the help of our employees — thousands of electric ranges and water heaters have been sold to our customers and these sales have resulted not only in better satisfied customers but have added millions of kilowatt hours to our load.

Your president, Mr. George N. Tidd, recognizes that the success of these sales activities has been made possible only through the wholehearted cooperation of every employee. He has secured a great deal of personal satisfaction from the manner in which you have promoted the interest of your company among your friends and neighbors in the community as evidenced by these successful sales campaigns.

Mr. Tidd is convinced that the most effective sales efforts are those promoted by the employees themselves and it, therefore, seems fitting and proper that this campaign should be called The President's All Employee Campaign, and we have a larger responsibility than ever before in making this campaign the most successful one put on.

The campaign closes on December 24th and inasmuch as this is Christmas Eve we think it would be a splendid opportunity to celebrate the event by greatly exceeding our quota.

We call this "The President's Plan" because Mr. George N. Tidd preferred that prizes be awarded not to a lucky few but to all loyal employees who by virtue of hard work secure prospects which result in sales of ranges and water heaters.

EMPLOYEE BONUSES

Every employee will be paid a cash bonus for actual sales completed from his or her prospect list in accordance with the following schedule.

FOR SALES OF LESS THAN FIVE UNITS	$2.50 per unit
FOR SALES OF FIVE AND LESS THAN TEN UNITS	$3.00 per unit
FOR SALES OF TEN OR MORE UNITS	$3.50 per unit

From this it is apparent that an employee who, at the completion of the campaign, was instrumental in selling 4 units would receive $10.00 but if his total is increased to 5 units he receives $15.00 and should he aid in the sale of 10 units he would receive $35.00.

HERE'S A REAL OPPORTUNITY TO EARN EXTRA SPENDING MONEY FOR CHRISTMAS. Make your plans to be among the top notchers in your district. Do a good job — get your friends and family working for you.

Everyone Can Be a Winner Under the President's Plan

SPECIAL DEPARTMENT AWARDS

The employee in each of the following departments who is responsible for the greatest number of sales in his or her department may choose any one of the valuable prizes listed. Competition for these departmental prizes shall be on an inter company basis. This means that in the entire American Gas and Electric System there will be three employees honored and rewarded for their outstanding sales assistance.

Departments-

ACCOUNTING DEPARTMENT

Embraces all employees of the Main Accounting office, central billing, local office, stores department and every employee coming under the supervision of the accounting department.

ENGINEERING DEPARTMENT

Embraces all employees in the distribution, transmission plant, substation, drafting and engineering, meter, underground, service etc.

COMMERCIAL DEPARTMENT

Embraces all employees coming under the direct supervision of the Power Engineer, Manager of Lighting Sales etc. (Residential Salesmen not included)

CHOICE OF PRIZES

. . . LADIES' OR MEN'S WRIST WATCH.
. . . CHEST OF SILVER.
. . . PHILCO TABLE MODEL RADIO.
. . . AUTOMOBILE RADIO.
. . . INDIRECT BRIDGE LAMP.
. . . WESTINGHOUSE FOOD MIXER.

These prizes are well worth going out after, and they are the grand prizes over and above the special employee bonuses.

GEORGE N. TIDD TROPHIES

Award to GENERAL MANAGER — **SILVER CUP**
To the General Manager of the Company having attained the highest per cent over quota.

Award to DISTRICT OR DIVISION MANAGER — **SILVER CUP**
To the District or Division Manager whose division finishes with the highest per cent over quota.

Award to DISTRICT SUPERINTENDENT — **SILVER PLACQUE**
To the District Superintendent whose district finishes with the highest per cent over quota.

Award to MANAGER OF LIGHTING SALES — **SILVER PLACQUE**
To the Manager of Lighting Sales whose division finishes with the highest per cent over quota.

Make your manager happy by winning for him one of these trophies. The honor of placing first in a sales campaign such as this is truly an honor.

INVESTIGATE THESE SPECIAL OFFERS

We have arranged with the Hotpoint and Westinghouse companies to allow YOU 50% discount from the regular selling price of any range in their line during the President's All Employee Campaign. This permits you to buy an electric range for YOUR home below company cost. You will be surprised how little the payments will amount to spread over a twenty four month period — AND THE OPERATING COST TO YOU WILL SAVE ENOUGH OVER PRESENT METHODS TO MORE THAN PAY FOR THE RANGE.

Also both Westinghouse and Hotpoint continue their offer of a special discount to utility employees on the purchase of a water heater. Hotpoint offers you 40 & 15%, and Westinghouse offers you 50% from list price.

Here's how we feel about employees purchasing ranges and water heaters . . . . If you can afford to buy — by all means you should be a user for after all it is from the use of such appliances that you gain your livelihood. It is through your using ranges and water heaters that others become convinced of their many superior features. If conditions are such that you cannot afford to buy now . . . . be a booster anyway . . . . and buy when you can. But the opportunity now is certainly the best offered you in many years.

$ $ $ Thousands of Dollars for a Merrier Christmas $ $ $

Face of broadside—greatly reduced—distributed to employees

among the companies as well. Mr. Tidd, our president, has offered trophies in the shape of plaques and cups to the companies, divisions and districts having the highest standing.

At the same time, employees not in the sales department have been offered inducements in the way of prizes to bring good, live prospects to the attention of the sales department. The sales department, however, is responsible for the sales and for the contact with the customer in completing these sales. In the President's Plan Campaign now in progress, this employee cooperation has been recognized by direct cash inducements rather than by the previous method of prizes. Under the plan an employee who turns in up to five prospects from which sales result receives compensation of $2.50 a unit. If his prospect list results in sales in excess of five and less than ten, he is compensated at the rate of $3 for each prospect sold. For ten or more prospects resulting in sales he receives $3.50 for each prospect sold. It can be said that this is a cumulative compensation plan and retroactive in the sense that as an employee increases his prospects who are sold, his compensation on the preceding prospects sold automatically increases. We are confident that this part of the plan has been materially instrumental in securing a high percentage of quota for the first four weeks of the campaign.

At the beginning of each campaign meetings similar to the Newark meeting are held throughout the entire system. They range all the way from mass meetings held in large cities such as Scranton and Canton to the small meetings conducted in some district too remote to permit attendance by its employees at the big company rallies.

We believe that the details of campaign procedure are of relative unimportance, so long as the factor of employee and manager cooperation is present. The degree of success attained by American Gas and Electric Company subsidiaries, in having placed upon their lines a considerable number of electric ranges and water heaters in the last three years, is, in no small measure, due to the recognition by men in these companies, whose duties are not strictly commercial, of the importance of lending their personal effort and interest continuously to the building of this type of residence load. This success has been attained in the face of the obvious difficulty brought about by economic conditions, and in spite of low fuel cost from other sources, which is available in much of the territory.

In our companies, sales meetings are now held where only a very small proportion of the attendance is represented by the sales department itself. Accountants, line crews, meter men, power plant employees sit in the front rows at these sales meetings. Competition for prospects among employees of the company outside of the sales force, and intercompany competitive campaigns in which the interest of all employees can be aroused, have materially increased the sale of these heavy duty appliances.

Our companies have, for years, followed the practice of merchandising only those items which we do not believe have yet had general public acceptance—hence our concentration, at the present time, on the sale of the electric range and the electric water heater. Thousands of these appliances have been added to the lines of the American Gas and Electric Company system in the last five years.

With the rates already existent among the private companies, the popular argument for low residential electric rates is quickly and automatically solved if the residential customer becomes a user of energy in quantities, let us say, in excess of 5000 kilowatt-hours a year. While it is meritorious and necessary to point out to the customer the benefits derived from the increased use of better lighting and small appliances, nevertheless this minimum figure cannot be reached by these activities alone and only through the medium of an aggressive all-employee sales program on the large energy-using devices can the goal be approached.

REVENUE ANALYSIS OF SALES CAMPAIGNS

Methods to aid the sales department and the executive in determining the kilowatt hour increase from specific sales campaigns and the extent to which such sales represent replacement or additional load

By J. J. McDonnell
Kansas City Power & Light Company

A paper presented before the Accounting Conference of the Missouri Valley Electric Association, Kansas City, Mo., Nov. 16-17, 1934.

There seems to be a general feeling that for some time the accounting sections of central station companies have not had complete information which would assist the sales managers to determine what effect certain sales campaigns developed in increasing kilowatt hour consumption.

At the best it has only been a guess as to whether the appliance sold replaced an appliance already in use, for that result would be no increase in kilowatt hour consumption, assuming that each appliance was used the same number of hours and consumed the same number of kilowatts per hour.

A record which would bring out the kilowatt hour increase might be of value also in determining what effect sequence metering has in certain territories where they have been installed to prevent current diversion. There is no question in anyone's mind that when a meter of this type is installed it has an effect other than on the particular installation where it is put in operation, for it does not take the customer long to know that he cannot tamper with the meter and this fact spreads very rapidly to adjoining neighbors and makes those parties a little more cautious in trying to tamper with their meters.

A comparable record on kilowatt hours consumed in one month compared with another or one year compared with another should bring out what effect certain sales activities, as well as the changing of the old type meter and wiring to meters which are practically fool proof, has on kilowatt hour increase.

In order to accomplish this result it will necessitate the breaking down of the bookkeeping records so that as near as possible the same number of customers will be included in a given territory.

Such a report should show the information listed in Exhibit 1.

Supporting this report would be a recapitulation report covering the total number of meters in a district and the territories comprising the complete district. The report required would cover data for the items shown in Exhibit 2.

Also, in addition to these reports there would be supporting graphs showing the kilowatt hour increase or decrease as the case might be. These graphs would cover a certain number of territories which comprise a district or a certain number of districts which comprise a section of a community. Going further these graphs could be prepared showing the kilowatt hour per customer inasmuch as the report gives the number of customers in the territory or district and the total kilowatt hours consumed so the average could be readily figured.

Another graph would cover the gross revenue dollar based on the total cost of merchandise plus the selling expense which is brought about through the sale of appliances.

In order to set up such a system it will be necessary to establish a sales budget. This sales budget to cover the anticipated sales which should be made during certain months of the year per residential meter. As I understand it, the national average is $6.00 per customer per year when setting up such a budget. In order to accomplish the purpose it will be necessary to divide the customers into territories the same as is done on determining the kilowatt hour increase or decrease, setting up a dollar sales per meter budget.

In order to accomplish this so that the reports will be of value, it would be necessary to establish correct selling prices and route the billing and sales

(Continued on page 405)

EXHIBIT 1

District No. .....
Total customers: This year..... Last year.....
KWH sales: This month..... This month last year.....
KWH sales per customer: This month..... This month last year.....
KWH sales: 12 months ending this year..... 12 months ending last year.....
KWH sales per customer: 12 months ending this year..... 12 months ending last year.....
Merchandising quota this month.....
Net merchandising sales this month.....
Per cent of quota this month.....
Net merchandising quota year to date this month.....
Net merchandising sales year to date this month.....
Per cent of quota year to date this month.....
Sales per customer year to date this month.....
Quota sales per customer year to date this month.....

EXHIBIT 2

MONTHLY RECAPITULATION NEW BUSINESS REVENUE ANALYSIS

District No. .....
Total customers: This year..... Last year.....
KWH sales: This month..... This month last year.....
Total KWH sales per customer: This month..... This month last year.....
KWH sales: 12 months ending this year..... 12 months ending last year.....
KWH sales per customer: 12 months ending this year..... 12 months ending last year.....
KWH increase.....
Percentage increase.....

Then a supplement to Exhibit 2:

District No. .....
Merchandise.....
Quota this month.....
Net sales this month .....
Per cent of quota this month.....
District standing..... } Year to date
Quota..... }
Net sales ..... }
Per cent of quota ..... }
Sales per customer..... }
Quota sales per customer.. }

PRIZES

to be administered by the

EDISON ELECTRIC INSTITUTE

AND AWARDED IN 1935

PRIZES TO INDIVIDUALS

For Papers on Subjects Relating to the Electric Light and Power Industry

BYLLESBY PRIZE . . . . . *Accounting*

Cash prizes of $100, $50 and $25 donated by Byllesby Engineering and Management Corporation, in memory of Colonel H. M. Byllesby, for the three most meritorious papers on any Accounting subject relating to the Electric Light and Power Industry.

FORBES PRIZE . . . . . *Public Relations*

A cash award of $250 donated by Mr. B. C. Forbes, Editor, Forbes Magazine, for the most meritorious paper dealing with the subject of Public Relations in the Electric Light and Power Industry.

LINDEMANN PRIZE . . . *Electric Cookery*

Cash prizes of $150, $100 and $50 donated by Mr. A. L. Lindemann, Vice President and General Manager, A. J. Lindemann and Hoverson Company, for the three most meritorious papers dealing with the Advantages of Electric Cookery for Domestic Purposes.

McGRAW PRIZE . . . . . *Engineering*

Cash prizes of $250, $150 and $100 donated by Mr. James H. McGraw, Chairman of Board, McGraw-Hill Publishing Company, for the three most meritorious papers on any Engineering or Technical subject relating to the Electric Light and Power Industry.

RULES AND CONDITIONS OF CONTESTS FOR PRIZES TO INDIVIDUALS

Any person employed by a company having membership in the Edison Electric Institute is eligible to enter the competition. No person is eligible to win two years in succession the identical prize or lower prize of the same award, but is eligible for a higher prize of that award. Papers must be the original work of the author or authors, prepared exclusively for this competition. Papers may be of any length, and pen-and-ink drawings or photographs suitable for reproduction may be included. Papers should be typewritten on one side only.

Papers will not be returned to contestants, but will become the property of the Edison Electric Institute and will be available for inspection at the General Offices of the Institute. The right is reserved to publish any paper entered in the contest.

The first page of the manuscript must give the following information: the name of the prize for which the paper is submitted, title of paper, name of author, name and address of employing company, title or character of position and home address. One paper may not be submitted for more than one prize.

PAPERS FOR ABOVE PRIZES MUST BE FORWARDED BY MARCH 1, 1935

PRIZES TO COMPANIES AND INDIVIDUALS

For Accomplishments in Specified Activities

CHARLES A. COFFIN AWARD

Sponsored by the General Electric Company

A Gold Medal, known as the Charles A. Coffin Medal, will be awarded to the public utility operating company within the United States which, during the year 1934, has made a distinguished contribution to the development of electric light and power for the convenience and well-being of the public and the benefit of the industry. The company awarded the medal will also receive $1,000 for its employes' benefit or similar fund.

HUGHES AWARD

Domestic Electric Cookery Load

A cup donated by Mr. George A. Hughes, President, Edison General Electric Appliance Company, Inc., to the Company Member of the Edison Electric Institute showing the greatest contribution to the development of the Domestic Electric Cookery Load, through promotion, or selling, or both, during the twelve month period ending February 28, 1935, and cash prizes totaling $1,000 to the individuals responsible for the achievement.

MARTIN AWARD

Rural Electrification

A bronze plaque donated by Mr. Thomas W Martin, President, Alabama Power Company, to the Company Member of the Edison Electric Institute showing the greatest contribution to the advancement of Rural Electrification (agricultural advancement within the company's territory due to uses of electricity, development of rural load, cooperation with other agencies, extension of rural lines, organization and plan for conducting rural electric development) during the year 1934.

IMPORTANT—Complete details and registration forms for the Charles A. Coffin Award, the George A. Hughes Award, and the Thomas W. Martin Award should be secured from the Secretary, Edison Electric Institute, 420 Lexington Avenue, New York, N. Y.

Elaborate and costly exhibits are unnecessary. The merit of the enterprise presented in papers or exhibits will be the prime factor in determining awards, without regard to the size of competing companies.

PRESENTATIONS OF ACCOMPLISHMENTS MUST BE FORWARDED BY APRIL 1, 1935

Papers and exhibits for 1935 prizes should be addressed to the Secretary, Edison Electric Institute, 420 Lexington Avenue, New York, N. Y. Winners will be announced and prizes awarded at the 1935 Convention of the Edison Electric Institute

PRIZE AWARDS COMMITTEE: Thomas N. McCarter, James E. Davidson, Frank W. Smith, *Chairman*, M. T. Chandler, *Secretary*

A NEW TYPE OF NETWORK PROTECTOR

By W. R. BULLARD

Electric Bond and Share Co.

Presented at Meeting of Transmission and Distribution Committee, EEI, Chicago, Ill., Oct. 23, 1934

Much has been written about operating requirements for low voltage a-c network protectors. The tendency in the past has been to make these requirements rather complicated and difficult of fulfilment. In a paper written for the AIEE several years ago, the author himself was guilty of setting forth some rather technical features of the network relay operation, which he then considered desirable as a goal for ultimate development.

In the early days of development, some of the supposedly necessary requirements revolved around delicate operating adjustments, and particularly the delicate balance of phase and voltage on the two sides of the switch in the reclosing operation. One thing that brought these relations prominently into the picture at the time was the possibility that automatic synchronization at the load would eventually be needed. Another was that the delicate adjustments for opening the switch on reverse magnetizing current of the distribution transformers, etc., required a very delicate voltage control on the closing operation to prevent the switch from "pumping," under lead or circuit conditions where discrimination as to which way the energy would flow after the closing operation depended upon very small differences of voltage between the two sides of the switch.

The development of low voltage a-c networks is now in an advanced stage and some of the early conceptions (for instance, automatic synchronization) have not materialized. Other factors, not recognized at the start, have come into the picture—such as periodical reversals of power flow in portions of the network, causing an undue number of operations of the protectors when adjusted for sensitive operation on opening. Another factor of comparatively recent origin is the recognition of the possibility of extending the network development into overhead systems. This is an enormous and undeveloped field of application for the low voltage network principle, the development of which is largely at a standstill, due to too complicated construction, excessive first cost, and too expensive maintenance, of the present types of network protectors, for this application.

In view of these factors, the writer recently has arrived at the conclusion that the development of network equipment along the lines of complicated requirements and delicate mechanisms to fulfill these requirements, has been largely unnecessary; and that there is an urgent need for equipment of considerably simplified design, to provide reduced costs of installation, testing, and maintenance, and also reduced cost of the apparatus itself. With this in mind, the writer solicited the cooperation of the Palmer Electric and Manufacturing Company in the development of a simplified type of network protector. After a considerable amount of study and experimentation, the device about to be described was evolved.

Incorporated in the design of this new protector are:—a new type of reverse energy and automatic reclosing relay of rugged and simplified construction, a time-delay device actuated by a simple thermal element, and a reverse-phase lock-out device. In this design, the delicate phasing control, obtained in present network protectors by circuits bridging the open contacts of the switch, has been eliminated. Thus, if a sensitive opening adjustment is used, it is possible for the switch to reclose, under conditions of small voltage differences which would produce a reverse flow of energy, causing the switch to immediately reopen. However, the time-delay device functions to provide a considerable interval before the next reclosing operation, thus preventing an excessive amount of switch operations. This time-delay

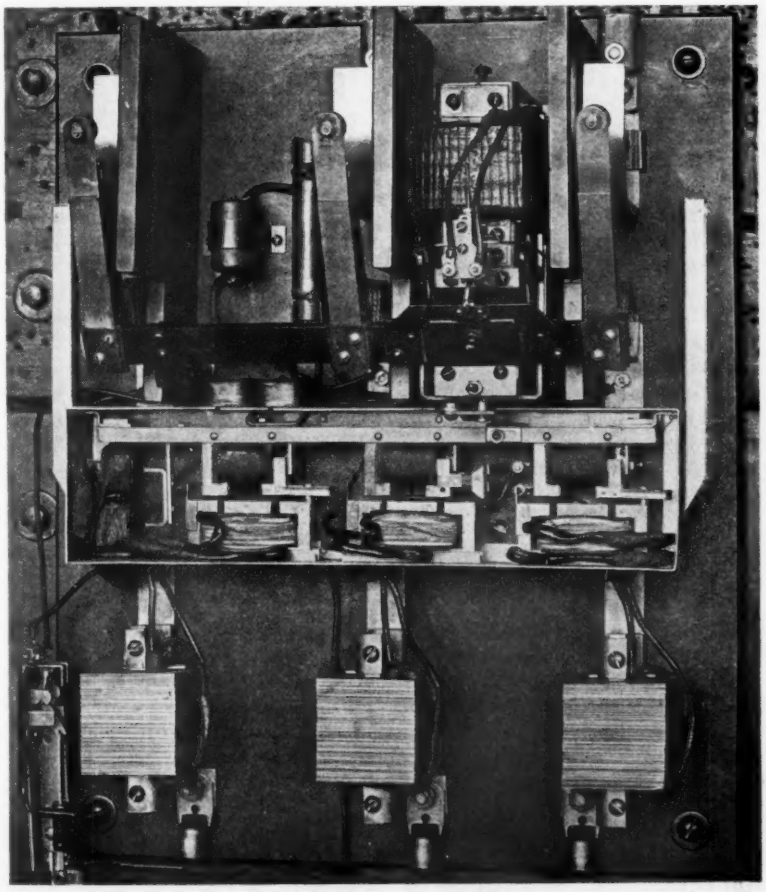


Fig. 1—Rough model of protector

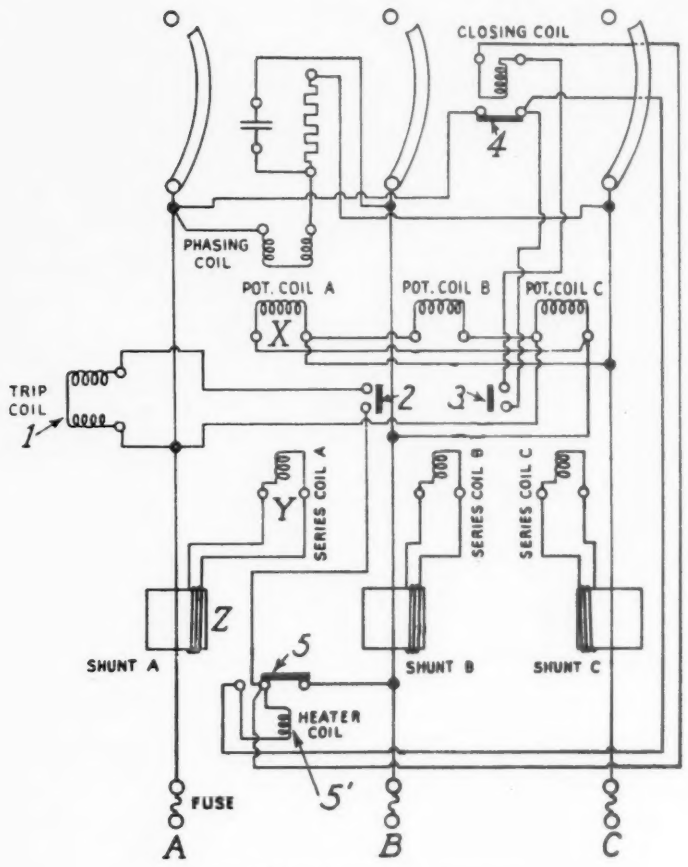


Fig. 2—Wiring diagram of protector

device is inoperative after the feeder has been de-energized. Therefore, when a feeder is being energized after having been out of service, the closing operation of the network protector is instantaneous. To prevent reclosing under certain crossed-phase conditions, a circuit combination together with a holding magnet operate to prevent reclosure under reversed phase-rotation of the supply circuit or feeder.

The photograph Fig. 1 shows a rough model of the protector, and was taken during the experimental stages of development. The reverse energy opening and automatic reclosing relay is shown in the center of this photograph. This relay does not operate on the induction principle, but rather upon direct action between the magnetic poles of a potential and a current element. Three potential elements, each consisting of a solenoid and a magnetic core with two poles projecting downward, are located above the current elements, each of which has an E-shaped magnetic core with three poles projecting upward. The three potential elements are mounted on a bar which is movable longitudinally. Movement of this bar in one direction energizes the main closing circuit of the switch; and in the other direction closes the trip circuit. Movement is caused by direct attraction and repulsion between the pole pieces of the current and potential elements, the direction of motion depending upon the direction or phase relations of current with respect to circuit potential.

This arrangement prevents spurious action of the relay when only one of the two elements (current and potential) is excited, and limits action to true energy flow response. This is because any magnetic force between the two elements, due to the excitation of one element alone, is a vertical force which produces no movement. The reclosing function is provided by attraction between three stationary armatures and the three potential element cores, and is operative when the three potential elements are excited at, or somewhat below, normal voltage.

The intention in designing this relay was to use insensitive reverse tripping of the switch, thus obtaining a rugged and simple mechanism by the sacrifice of sensitivity. However, when the design was tried out experimentally, it was found to be much more powerful than present types of disc-operated relays. Therefore, very sensitive settings could be obtained if desired. The device is so powerful, in fact, although consuming approximately the same amount of energy as a disc type of relay, that the smaller switches could be tripped directly by it under all but the most feeble types of reverse energy excitation. This relay also proved to be very quick acting, as its normal motion is only a fraction of an inch. Due to these two characteristics—high speed and high power—the design may well constitute an improvement in general purpose reverse-energy relays, particularly in cases where high speed of operation is required.

The time-delay device, shown in the lower left-hand corner of Fig. 1, consists of a quick-acting contact operated by a strip of thermostatic metal, in combination with a shunt heater coil of the vitrified enamel type. This device acts in conjunction with the trip coil, tending to hold the relay in the open position as long as the feeder circuit remains alive, after the switch has tripped. A delay of several minutes, if desired, can be obtained in the reclosing operation by this device. When the relay trips the switch, it is held in the opening position by the trip coil if the feeder remains alive. At the same time the heater coil of the time-delay device is energized and, in a pre-determined time, the thermostatic device will open the trip coil circuits, allowing the relay to return to its reclosing position, and at the same time opening the heater coil circuit. The thermostatic device, however, also opens the main closing circuit of the switch which, therefore, cannot close until the heater coil has cooled off and the thermostatic element has reclosed its contacts. Thus the time delay between opening and closing of the switch is fixed by the time taken for the thermostatic element to travel to the opening position, and back to the closing position. The heater coil of the thermostatic element, as well as the main closing circuit of the switch, are de-energized when the switch is in the closed position, by an auxiliary contact. Thus the only energy continuously consumed in normal operation of the switch, is that of the main reverse-energy relay itself and the reverse phase lockout device. The above described opera-

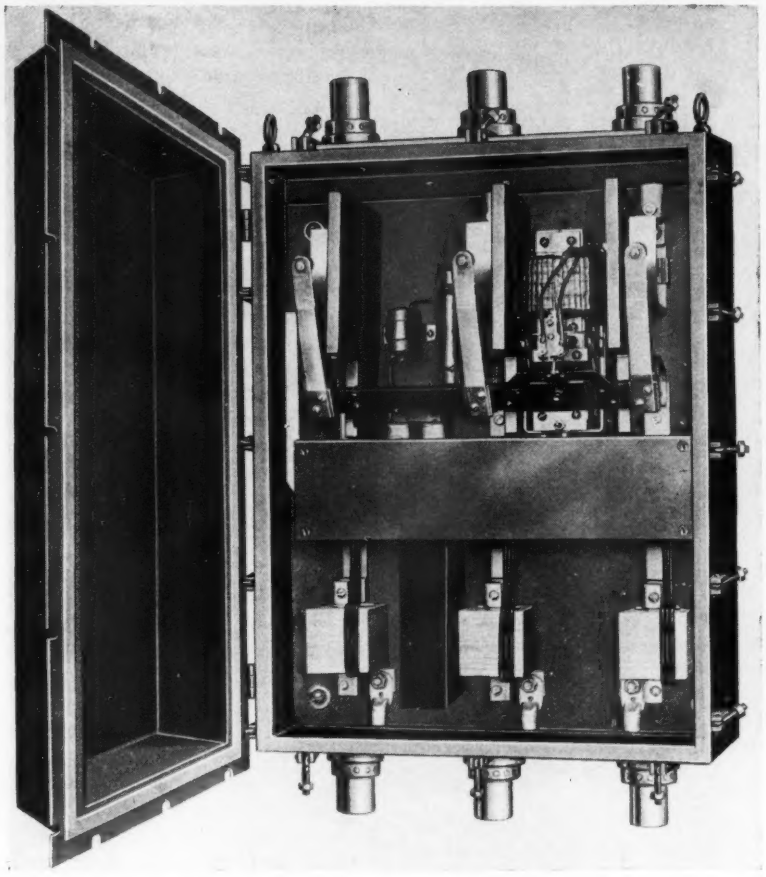


Fig. 3—Protector in more finished form

tion will be understood by reference to Fig. 2 which is a wiring diagram of the complete unit.

The reverse-phase lock-out devices consist merely of a holding coil in circuit combination with a resistor and a condenser. The combination is shown in the upper part of Fig. 2. The impedance values of the various elements are such that, with phase rotation of the feeder in one direction, the voltage across the coil is very low and the pull of the coil is insufficient to prevent the relay from operating. However, with the opposite phase rotation, the voltage across the coil builds up to the point where the relay is locked in the neutral position and is prevented from closing its contacts.

Fig. 3 is a photograph of a protector in more finished form than the model shown in Fig. 1. The complete equipment, although much simpler and more rugged than present types of network protectors, will perform most of the functions which they now perform. The feature which it lacks is sensitive phasing control on reclosure, for which is substituted the time-delay which prevents rapid pumping. The equipment will lock out on reversed phase rotation, thereby preventing a reclosure under the more usual types of crossed phase conditions, i. e., the twisting of two of the three phases. Sensitive opening can be obtained if desired. However, in many situations it has already been found desirable to provide insensitive settings on existing types of protectors. Such settings can readily be obtained with this new protector, and with such settings the question of pumping is eliminated.

The development of this equipment has passed the experimental stage, but the protector has not yet been applied in actual service. While designed primarily with overhead networks in view, it is applicable also to underground networks. Definite prices are not yet available, but it is believed that they will be sufficiently low to give an impetus to the development of overhead networks, which development has been hindered so far by the elaborate and costly design of automatic equipment.

Revenue Analysis of Sales Campaigns

(Continued from page 401)

tickets in such a manner that complete information would be obtained as the sales tickets are put through. In other words, in addition to the selling price of the article there would be the cost as well as any commissions paid, trade allowances, etc., to be taken into account and the results of which would be the gross profit made on the transaction.

From this a complete sales analysis would be compiled and broken down into classes of merchandise. Also from this sales analysis sheet there would be shown the commissions paid to the sales people and it would furnish information so that a complete sales report could be made of the salesman's activity in any given territory. For example:

EXHIBIT 3

SALES ANALYSIS SHEET

Sold to .....
Description of item.....
Salesman.....
Date.....
Ticket number.....
Contract price.....
Amount paid.....
Balance due.....
Terms per month.....
List price.....
Service charge .....
Carrying charge.....
Miscellaneous charges—code—amount.....
Allowances—trade in—code—amount.....
Contract price.....
Lot number cost .....
Gross profit.....
Sales commission.....
Supervisor's commission.....
Gross profit after commission.....

London Companies Merge

Six of the largest and most important London electricity supply companies have amalgamated to form a new company called the Central London Electricity Distribution Committee, Ltd., in a deal involving more than £10,000,000 and affecting a population of 500,000 in areas stretching from the Tower of London in the east of Hammersmith in the west, districts about seven miles apart.

The companies involved are the Charing Cross Electricity Supply Company, Ltd., Westminster Electric Supply Corporation, Ltd., St. James & Pall Mall Electric Light Company, Ltd., Kensington & Knightsbridge Electric Lighting Company, Ltd., Chelsea Electric Supply Company, Ltd., and the Brompton & Kensington Electricity Supply Company, Ltd. J. A. Gatti of the Charing Cross company is managing director of the new combine.

COMMERCIAL NOTES

Running Water Program

At the meeting of the Electric Water Systems Council called by Chairman P. H. Powers, Nov. 14, at Cleveland, Mr. Herbert Angster, secretary of the association of pump manufacturers, reported practically 100 per cent of its membership in participation in the Running Water Program. The majority feel that a splendid start has been made and have no hesitancy about continuing the activity during 1935. Recognizing that results would have to be slow, the Fall concentration has been considered the groundwork for vigorous action starting with the second period of concentrated effort on Feb. 1, 1935. Some of the Central West companies have been handicapped by the drought, and others have been preparing live prospect lists before starting local action.

The Committee is gratified to note the support given by the farm magazines and trade papers. It was concluded that a definite tie-in be established between the Running Water Program and the Home Modernizing Program. A revised broadside will be available and a supplemental plan book is now in the process of development by a special committee. A feature of the promotional material will be an animated window piece for dealers, which cannot fail to produce attention. Chairman Powers stated that the financial condition of the Council was most satisfactory.

Electrical Housewares Offers $2400 in Prizes

The Table Cookery Committee starts the New Year with a brand new medium of information, a contest plan and new ideas in order to bring the small appliances to the fore. This joint effort of the Edison Electric Institute in cooperation with manufacturers has been so favorably received, and has such possibilities for profitable results, that the fund for the Program has been increased and limitations have been broadened.

Many a utility executive concluded that the smaller plug-in appliances had been nurtured to a point where the entire line could be turned over to the general trades to carry on with a blessing, but no further help. There were companies that stopped advertising and promoting the small appliance line. The dealers have not produced enough volume or enough profit to expend the sums in selling the service rendered through small appliances as vigorously as did the utilities. Where the utilities continued promotion there has been successful selling. In other places there has been a startling drop in purchase of electrical appliances by consumers.

The grand objectives of the Electrical Housewares Committee are to create wider interest in promotion and sale of this class of devices among all retail outlets, and, secondly, to encourage planned and sustained merchandising effort of electrical housewares in order to establish the small appliance market on a higher plane.

To effectuate the first objective, a monthly news medium will be published under the title *Electrical Housewares*, which will be successor to *Table Cookery Topics*. It is expected that this informational bulletin will reach all classes of the trade through the help of manufacturers, wholesalers and utilities.

To gain the second objective the Committee announces a National Better Merchandising Contest as the big feature. There will be $2,400 in prizes, $600 to be allotted in each quarter.

Prizes will be offered as follows:

First quarter (January, February and March) awards will be made for best plans submitted and applied for "Sales Training of Retail Clerks in Selling Electrical Housewares."

Prizes are offered to three classes of stores, the departmentalized store, miscellaneous dealers, and utility stores.

The first prize in each class will be $100; the second prize will be $50. There are also to be five Honorable Mention prizes in each of these classes worth $10 each, making a total of 21 prizes.

The first contest period starts Jan. 1 and ends March 31. Reports of plans and methods applied, and results obtained, must be received by the Electrical Housewares Committee, care of Edison Electric Institute, 420 Lexington Avenue, New York City, on or before the tenth of the month following the close of the quarterly contest period. No elaborate reports are requested. They should be typewritten and as brief as adequate presentation of accomplishment will permit.

Winners of each contest, and a story of how it was done, will be announced in *Electrical Housewares*.

Other Quarterly Contests

Other quarterly contest awards will be made for excellence in Store Selling Displays, Window Selling Displays, and Advertising and Promotional Effort.

Better Light-Better Sight

The National Better Light-Better Sight Program continues to gather momentum.

By January 1st it is confidently predicted the lighting campaigns in the domestic field will have reached a new all-time peak. The I.E.S. Better Sight Lamps sales appear to be constantly increasing in volume—over 370,000 have been reported sold as of December 1st and the best of the season yet to come.

The Commercial Lighting Campaign is expected to get under way in January with the National Housing Activity the main prop in the suggested program.

A new light prescribing technique with new innovations in light prescribing equipment will be announced very shortly by the Better Vision Institute, the national association of the optical industry.

The introduction of this new technique by the optical manufacturers and jobbers to the thousands of eyesight specialists over the country will bring adequate lighting into their prescriptions and recommendations and unquestionably prove to be one of the greatest advances in emphasizing to the public the close relationship of light and vision.

Full details will be released through the Better Vision Institute.

A READABLE TEXT BOOK

For those interested in lighting, whether salesmen or those with a general interest in this basic subject, we commend for reading the book recently published by Dr. Matthew Luckiesh of the Lighting Research Laboratory of General Electric Company on "Seeing and Human Welfare." The factual data wrapped up in an inspirational coating will make interesting and profitable reading. The publisher's price of the book is $2.50. Any orders sent direct to Dr. Luckiesh at Nela Park, Cleveland, Ohio, will be supplied, in lots of ten or more, at a price of $1.50 each.

THE ACCIDENT PREVENTION COMMITTEE

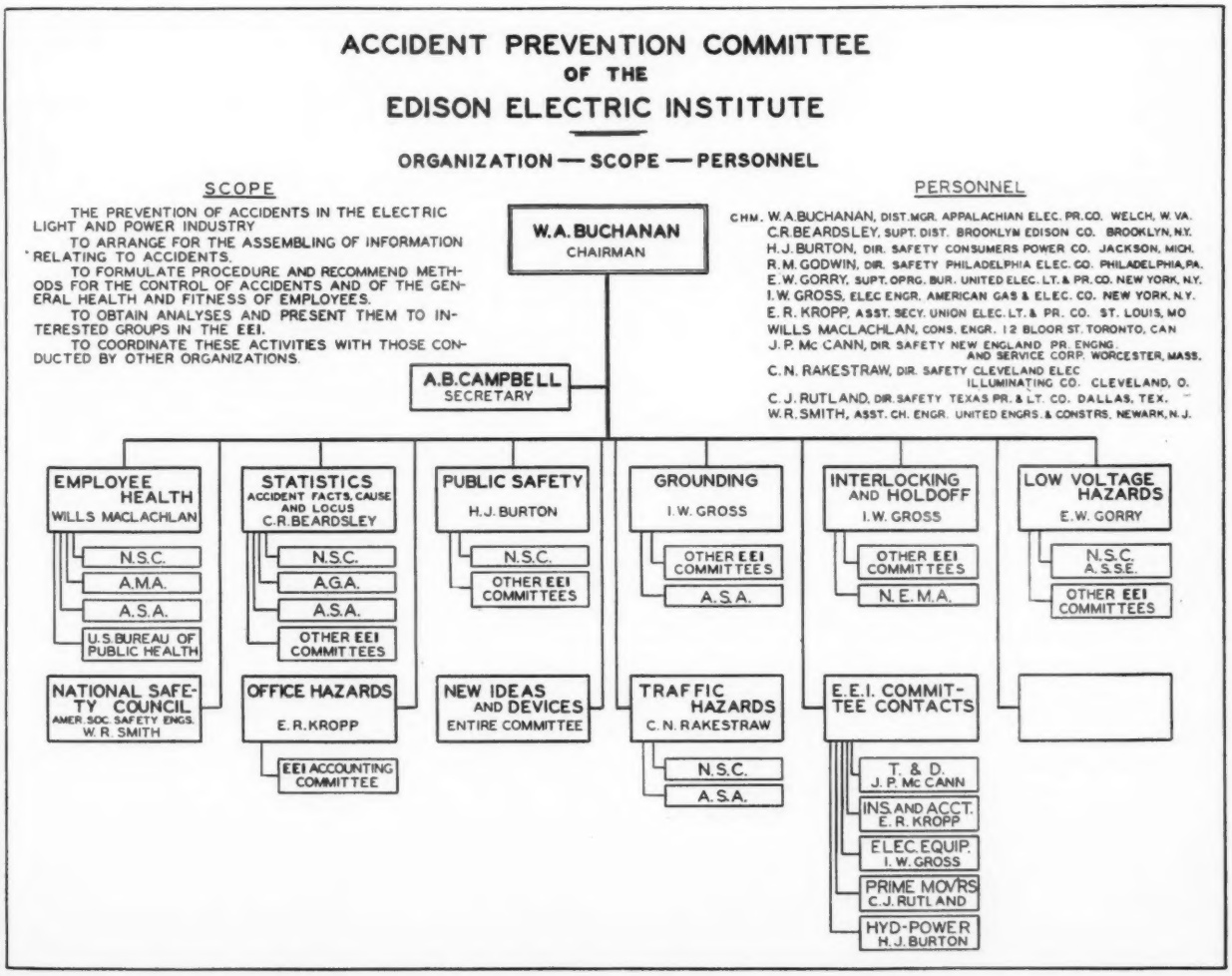
The Operating Committee of the Edison Electric Institute, at its meeting in Atlantic City last June, authorized the formation of an Accident Prevention Committee of approximately 12 to 15 members, and approved the appointment of Mr. W. A. Buchanan, District Manager, Appalachian Electric Power Company, Welch, West Virginia, as Chairman.

Chairman Buchanan faced no easy task in selecting the personnel of his committee. The former Accident Prevention Committee, the personnel of which was considerably greater than that of the present committee, had been in existence for approximately 20 years when the N.E.L.A. was dissolved in February, 1933. During the life of that committee, interest in accident prevention and safety within the electric light and power industry had greatly increased throughout the country and there were many men who were competent and desirous of serving on any committee devoted to the safety problems within the industry. In choosing the Committee membership, it was therefore necessary to select a few from many that were qualified to serve, and to take the location of members into account to obtain wide geographic representation. Furthermore it was felt desirable to bring to the committee a diversity of viewpoint and personal interest. How well the latter objective was accomplished is shown by the committee personnel which includes one district manager, one superintendent of distribution, five safety directors, two of whom had had engineering and construction experience, one superintendent of operation, one executive accountant, one electrical engineer and two construction engineers. A problem which has not yet been fully met is that of establishing contact on a national scale with other groups and committees that deal with safety problems of interest to this industry. This was formerly done through Geographic Division channels but since these no longer exist, other means for supplying this contact will need to be found. The Committee is now giving its attention to this problem and doubtless its plans will be announced in the near future.

The first meeting of the new committee was held at the Carter Hotel in Cleveland on Oct. 3, and the following scope was adopted and later approved by the Operating Committee:

The prevention of accidents in the Electric Light and Power Industry.

To arrange for the assembling of information relating to accidents.



To formulate procedure and recommend methods for the control of accidents and of the general health and fitness of employees.

To obtain analyses and present them to interested groups in the EEI.

To coordinate these activities with those conducted by other organizations.

This scope does not differ greatly from that of the former Accident Prevention Committee, except the addition of employee health which was formerly handled by the Industrial Relations Committee. In the discussion of this phase of the Committee scope, statistics show that for the industry as a whole, the lost time due to sickness was 10 to 15 times that due to accidents. Also, the definite relationship which had been established between health and accidents, justified this committee taking an active interest in employee health. Any work it may do in this direction will of course be coordinated with that of other committees of the Institute that may be interested in this subject.

The need for cooperating with other groups outside of the industry interested in accident prevention and safety work was realized and definite plans were made looking toward cooperation with the following groups or organizations:

American Gas Association.
American Institute of Electrical Engineers.
American Society of Mechanical Engineers.
American Society of Safety Engineers.
American Standards Association.
Illuminating Engineering Society.
National Safety Council.
U. S. Bureau of Health.

Should it be found that there are other groups interested and working with the safety problems of the electrical industry, there should be no difficulty in arranging for the necessary cooperation.

During a part of the meeting, a staff member of the National Safety Council was present and matters of common interest were discussed. While no commitments were made to avoid duplication of effort, it was the consensus of the Accident Prevention Committee members that this committee should handle safety problems of a technical nature and that safety problems involving public education should be handled by the National Safety Council.

At the meeting held on Oct. 3, two groups of subjects were discussed. One consisted of projects that were initiated by the former Accident Prevention Committee but which had not been completed when the N.E.L.A. was dissolved. This group consisted of the following subjects:

(a) *Cause and Locus Reports.* Experience data are difficult to obtain but a start will be made by each committee member collecting data from his own company. This will be summarized and supplemented as conditions permit.

(b) *Bibliography.* A partial list of references has been made. To this will be added references to all other literature and information on accident prevention as it concerns this committee. The completed list will eventually be classified for use by those seeking information on specific subjects.

(c) *Grounding.* A comprehensive report on this subject is now under preparation in one of the other EEI Committees and arrangements have been made whereby the committee's recommendations on the subject of grounding will be included.

(d) *Statistics.* The collection of accident statistics for the industry will be continued by the General Office and made available as heretofore.

(e) *Low Voltage Hazards.* The committee will continue to study this subject closely in an effort to make further reductions in this type of accident.

The other list of subjects consisted of new items which Chairman Buchanan presented for discussion. These were as follows:

(a) *Health;* (b) *Inadequate Physique as Cause; and* (c) *Inherent Weakness Aggravation.* These were given general consideration. Further study will be required.

(d) *Hazards vs. Correction.* It was felt that not much could be done on this

(Continued on page 416)

TABLE I—ANALYSIS OF ACCIDENTS AS REPORTED BY 366 COMPANIES FOR 1933

(For the Electric Light and Power Industry—By Number of Employee Groups)

No. of Cos.	*Average Number of Employees*	*Fatal Accidents*	*Lost Time Accidents*	*Days Lost*	*Cost of Accidents*	*Ratio*
			Total United States			
366	200,831	132	....	.....	.....	0.66
363	200,701	...	4,298	.....	.....	2.14
359	199,231	...	....	105,057	.....	53
285	122,323	...	....	.....	1,820,811	$14.89
			5,001 and Over			
6	64,692	20	....	.....	.....	0.31
6	64,692	...	1,011	.....	.....	1.56
6	64,692	...	....	25,505	.....	39
3	20,056	...	....	.....	299,281	$14.92
			2,501-5,000			
10	32,688	19	....	.....	.....	0.58
10	32,688	...	551	.....	.....	1.69
10	32,688	...	....	11,699	.....	36
7	22,382	...	....	.....	334,115	$14.93
			1,001-2,500			
26	40,202	32	....	.....	.....	0.80
26	40,202	.	779	.....	.....	1.94
26	40,202	...	....	23,406	.....	58
21	32,306	...	....	.....	474,231	$14.68
			501-1,000			
43	30,411	22	....	.....	.....	0.72
43	30,411	...	905	.....	.....	2.98
43	30,411	...	....	23,792	.....	78
36	25,242	...	....	.....	386,298	$15.30
			251-500			
42	14,760	18	....	.....	.....	1.22
42	14,760	...	420	.....	.....	2.85
42	14,760	...	....	8,569	.....	58
31	10,864	...	....	.....	112,891	$10.39
			100-250			
75	12,859	17	....	.....	.....	1.32
75	12,859	...	415	.....	.....	3.23
73	12,392	...	....	8,486	.....	68
54	9,520	...	....	.....	169,729	$17.83
			51-100			
42	3,047	1	....	.....	.....	0.33
41	3,929	...	123	.....	.....	3.13
40	2,868	...	....	1,896	.....	66
32	2,284	...	....	.....	36,283	$15.89
			26-50			
34	1,296	2	....	.....	.....	1.54
34	1,296	...	76	.....	.....	5.86
33	1,254	...	....	910	.....	73
25	918	...	....	.....	4,276	$4.66
			11-25			
44	742	1	....	.....	.....	1.35
43	726	...	23	.....	.....	3.17
43	726	...	....	714	.....	98
33	531	...	....	.....	2,094	$3.94
			0-10			
44	232	0	....	.....	.....	0.00
43	228	...	5	.....	.....	2.19
43	228	...	....	80	.....	35
43	215	...	....	.....	1,613	$7.50

MEETING OF THE JOINT COMMITTEE ON PLANT COORDINATION

The Joint Committee on Plant Coordination of the EEI and Bell System held a meeting, Nov. 16, at the A. T. & T. Co. headquarters in New York. The Bell System Chairman, Mr. Charlesworth, presided. This was the second meeting of this committee under the new organization for handling the E.E.I.-Bell System joint work on coordination, as described in the August issue of the E.E.I. BULLETIN. Various matters of committee procedure were discussed and agreed on, and reports were received from the subcommittees on specifications and agreements and on development and research.

Specifications and Agreements

A draft of proposed joint use specifications has been prepared and additional data are being secured in order that final disposition may be made of certain sections which operating experience has shown should be revised. Advice and assistance are being secured from representatives of the member companies of the E.E.I. and Associated Companies of the Bell System as this work progresses.

Following the completion of the joint use specifications and agreements it is proposed to draft specifications covering the construction of overhead crossings of supply and telephone lines and conflicts between such lines.

Following the adoption of the Principles and Practices for the Joint Use of Wood Poles by the Joint General Committee in 1926, one of the larger power companies and one of the Associated Companies of the Bell System prepared a flat rental per pole form of agreement based on these Principles and Practices. This agreement form has been widely used as a basis for joint use arrangements between individual power and telephone companies. It is proposed to revise this agreement, particularly with respect to arrangement and engineering features, in the light of experience with it since 1928, and to make such changes as seem desirable with the view of making it even more generally useful to the operating companies. It is also proposed to study existing joint ownership agreement forms with the same objective in view.

Development and Research

In the interest of simplification, the divisional organization has been dropped. Responsibility for conduct of specific research assignments will be continued in joint committees as in the past. To this end the existing project committees will carry on undisturbed with the same designations, assignments and personnel, subject to such changes as may from time to time be decided upon. Also the procedure previously followed as regards types of reports, their preparation and presentation will be continued.

Meetings offering full opportunity for discussion of reports, work in progress or proposed, etc., will be held by the Joint Subcommittee on Development and Research at intervals of approximately six months. The programs of these meetings will be arranged with the aim of grouping together closely related projects, to better coordinate discussion and for the convenience of those interested in a part only of the entire program. At these meetings each Project Committee will present a Progress Report and also such Technical Reports (tentative) as the status of its investigational work may justify.

The more important tangible results of the Joint Development and Research activities since their inception are incorporated in a series of Engineering Reports and a series of Provisional Reports. A list of these reports is given in the accompanying table.

In general, the work of this committee is of a continuing nature so that in considering plans for future work it is to be expected that the active items will continue to fall largely within the same categories as at present with, however, such changes periodically in specific items as changing requirements suggest. It has been the practice to revise the work schedules once a year, and it is proposed to continue this practice. Such a review of the present schedules will shortly be made, and the revised work program will be submitted to the Plant Coordination Committee at the first opportunity thereafter.

In accordance with the recommendations of the Joint Subcommittee on Development and Research the Joint Committee on Plant Coordination approved the following reports as Engineering Reports:

"The Effect of Vacuum Tube Amplifiers and Telephone. Repeaters on Acoustic Shock."

"Use of Copper Oxide Varistors in Reducing Acoustic Shock."

Also, the following reports were approved as Provisional Reports:

"Supplementary Factors for Estimating Noise-to-Ground from Magnetic Induction in Joint Use Cable Circuits."

"A-C Type of Short-Circuiting Relay Protector."

"Internal Impedance Characteristics of Copper Covered Steel Cable."

Approval was given to the issuance of the Abridgment of Engineering Report No. 26 entitled "Shielding of Ground-Return Circuits at Low Frequencies."

FALL MEETING OF THE JOINT SUBCOMMITTEE ON DEVELOPMENT AND RESEARCH

The Fall meeting of the Joint Subcommittee on Development and Research was held in the Auditorium of the Bell Telephone Laboratories, on Nov. 15 with the Bell System Chairman, Mr. Warren, presiding. The meeting was arranged in three sessions for the convenience of the members and in order to better correlate the discussion of the related projects. The first session, dealing with noise frequency induction problems, was comprised of Projects 1A, 1B and 1C. The second session, dealing with low frequency induction problems, consisted of Projects 2D, 2J and 2K. The third session, consisting of Projects 2A, 2C and 2G, was concerned with structural coordination matters. Each Project Committee presented a progress report describing the status of its work and plans for the future. These reports were discussed and various helpful suggestions regarding the work were made.

Project Committee 2J, which deals with the control of residuals, presented Technical Report 2J-6, entitled "Overvoltages on Transmission Lines Due to Ground Faults as Affected by Neutral Impedance." The present report is the first of a series of reports which will deal with specific phases of the problems associated with the use of neutral impedance. Subsequent reports will treat of such subjects as the effect of neutral impedance on the relaying of power sys-

tems, the limitations of neutral impedance purely from the standpoint of effectiveness in limiting induced voltages, etc. These reports are to amplify the corresponding sections of Engineering Report No. 27 issued in April, 1934, which discusses the general considerations in the use of neutral impedance.

The present report embodies the results of overvoltage observations under operating conditions on six overhead transmission systems which were operated with neutral isolated, neutral grounded through Petersen coils, through resistors of 50 to 75 ohms or directly grounded. The results of staged tests on three systems on which the neutral grounding ranged from the isolated to the directly grounded condition are also included. From these data, which were collected over a period of several years, and from certain calculations based on observations, overvoltages due to phase-to-ground faults are discussed from the standpoint of magnitude and frequency distribution under different grounding conditions. Factors other than the neutral ground connection are also discussed in relation to overvoltage. After Project Committee 2J revises this report in light of the discussion at the meeting, the Joint Subcommittee on Development and Research, in accordance with the Project Committee's suggestion, will transmit the report of the Joint Committee on Plant Coordination with the recommendation that it be approved as an Engineering Report.

ENGINEERING REPORTS AND PROVISIONAL REPORTS OF THE JOINT SUBCOMMITTEE ON DEVELOPMENT AND RESEARCH

(1) Engineering Reports

E. R. No.	Date	Title
1	July, 1926	Progress Report on the Minneapolis Joint Use Investigation.
2	Sept., 1926	Study of the High-Frequency Currents in Power Lines Resulting from the Charging of Electrolytic Lightning Arresters.
3	Feb., 1927	Study of the High-Frequency Currents in Power Lines Resulting from the Charging of Electrolytic Lightning Arresters. (A Summary of Engineering Reports No. 2)
4	May, 1929	An Investigation of Ground Faults on a 33-Kv. Transmission System and the Resulting Voltages in a Parallel Telephone System.
5	May, 1929	Athenia-Passaic Ground Potential and Induction Investigation.
6	May, 1929	Minneapolis Joint Use Investigation.
7	May, 1929	Train Control Tests Made on the Delaware-Lackawanna and Western Railroad near Horseheads, N. Y., During 1926-1928.
8	Oct., 1929	Termination of Isolated Exposure Sections to Obtain Normal Metallic-Circuit Currents.
9	Apr., 1930	Short-Cut Methods for Calculating Noise in Local Telephone Subscriber Circuits in Cable Due to Exposures to Power Distribution Circuits.
10	Apr., 1930	A Method of Measuring the Balance of Open-Wire Telephone Circuits with Respect to Longitudinal-Circuit Induction.
11	Feb., 1931	Methods of Measuring Noise on Open-Wire Toll Circuits.
12	Feb., 1931	The Effects on Inductive Coordination of Generators Feeding Directly on the Line and Operating with Grounded Neutrals.
13	Feb., 1931	Short-Cut Methods for Calculating Noise in Open-Wire Subscriber Circuits Due to Joint-Use Exposures to Power Distribution Circuits.
14	May, 1931	Coupling Factors for Ground-Return Circuits, General Considerations and Methods of Calculation.
15	Feb., 1932	Wave Shape Survey on Operating Power Systems.
16	Apr., 1932	A Method of Estimating Noise in Open-Wire Toll Circuits.
17	Mar., 1932	Short-Cut Methods for Estimating Noise in Open-Wire Subscriber Circuits Exposed to Power Lines at Roadway Separations.
18	Feb., 1933	Longitudinal-Circuit Propagation Along Open-Wire Lines at Voice Frequencies.
19	Feb., 1933	Direct Capacitances and Capacitance Unbalances in Open-Wire Telephone and Joint Use Lines.
20	Aug., 1933	Exploring Wire Methods for Toll and Local Circuit Noise Studies.
21	Aug., 1933	Selective Devices for Reducing Harmonics in Power Systems. Part 1—D-C. Systems.
22	Aug., 1933	Wave-Shape Characteristics of Power Circuits Supplying Rectifiers.
23	Aug., 1933	The Impedances of A-C. Supply Systems at Harmonic Frequencies to Balanced Components.
24	Nov., 1933	Impedances of A-C. Supply Systems at Harmonic Frequencies to Residual Components.
25	July, 1933	Articulation Studies on the Effects of Noise.
26	Nov., 1933	Shielding of Ground-Return Circuits at Low Frequencies.
27	Oct., 1933	General Consideration in the Use of Neutral Impedance.

(2) Provisional Reports

Prov. R No.	Date	Title
1	1931	Practices and Physical Characteristics of Electric Supply Systems.
2	1931	Practices and Physical Characteristics of the Telephone System.
3	1931	Computation of Zero. Sequence Impedance of Open-wire Power Lines with and without Ground Wires and of Power Cables with Non-Magnetic Sheath.
4	1931	Short-Circuiting Relay Protectors.
5	1931	Preliminary Notes on the Metallic-Longitudinal Induction Ratio.
6	1931	The Coordination of Power and Communication Systems in Respect to the Joint Use of Poles.
7	1932	Magnetic Shielding Due to Grounded Telephone Conductors on Open-Wire Lines.
8	1932	An Antenna for Use in Studies of Open-Wire Toll Circuit Noise.
9	1932	Summary of Results of Wave-Shape Survey.
10	1932	Fault Impedance and Related Problems.
11	1933	Characteristics of Power System Faults to Ground.
12	1933	Power Line Construction Study.
13	1933	Positive Disconnection of Distribution Circuits for Faults to Ground.

Wisconsin Utilities Association Meetings

Engineers and operators of gas and electric companies met in joint and separate convention sessions, Nov. 22 and 23 at Madison, under the auspices of the Technical and Operating Section of the Wisconsin Utilities Association. The registration totaled 226.

G. S. Meyrick, Wisconsin Public Service Corporation, Green Bay, was elected chairman of the Electric Division, and Theron A. Brown, Madison Gas & Electric Company, vice-chairman.

The subjects of current diversion, interconnection of transformer and lightning arrester grounds, and effects of lightning surges on secondary distribution created animated discussion. The report by V. M. Murray and R. R. Benedict of the College of Engineering, University of Wisconsin, provoked controversial opinion, particularly with respect to the recommendation of the insertion of a gap to the interconnection to break down at a value of surge slightly less than that necessary to flash-over the transformer.

E. W. Hatz, transmission engineer of The Milwaukee Electric Railway & Light Company, reported that actual field operating test with newly developed lightning flash-over protectors will prevent service interruptions. He predicted that the high voltage Milwaukee-Port Washington line, now under construction, in incorporating new protective devices will set a new standard for continuity of service in Wisconsin.

George Smail, Eau Claire, Chairman, Meter Committee, reported on methods of detecting current diversion, how suspects are handled, what and how adjustments are made, success in collecting bills, how bills are calculated, preventive measures adopted, extent of diversion and prosecution.

V. M. Murray and R. R. Benedict of the College of Engineering, University of Wisconsin, presented results of a series of tests they made during the past year to determine the danger to which customers are subjected due to lightning surges on the line.

W. S. Campbell, Sheboygan, speaking on "Boiler Feed Water Problems," said that boiler water requires just as much, if not more, attention now than it did in the scaly days.

Frank J. Staska, Green Bay, Chairman, Radio Coordination Committee, reported that reputable appliance manufacturers are making progress in eliminating inherent radio interference from the equipment they produce.

"The committee is of the opinion that inherent radio interference from appliances is not a necessary evil and that it should be eliminated by the manufacturers at the factory," said Mr. Staska.

"Utilities cannot hope to exercise control over appliances sold by others, but we can preach the gospel of interference-free appliances that can be used without restraint."

O. C. Roehl, Green Bay, in speaking on "Business Building" and in describing the Wisconsin Public Service Corporation cooperative selling program, said in part:

"The entire progress of the utility business depends upon additional business. Some may say, 'Well, that's what the Sales Departments are for,' but I for one do not feel that I would like to give one department the entire responsibility for the growth and progress of the business.

"Here are some of the results we think we have accomplished with our business building program:

"1. The spirit of the employees has been improved—they have an intimate knowledge of the company's business and they feel that they have a responsibility in building the business.

"2. A sales-minded organization is in the process of development—making for greater business growth.

"3. Better public relations have resulted due to having all employees continually trying to sell the value of the services in the terms the customer can understand. This is evidenced by the fact that the number of complaints as to the cost of service and high bills are decreasing.

"4. The results of the prospect program for the first six months of active promotion are very encouraging.

6405 prospect cards have been turned in.
1676 major appliances have been sold on prospect cards.
$135,000 worth of appliances has been sold.
$36,000 in additional gross revenue was added by the sale of the 1676 major appliances.
72 per cent of all employees have actively participated in the plan.

"We feel that our employee business-building program has been and is more than paying its way. We are continuing it at the present time, and have just completed reviewing, as we did last year, the present business condition of the company and have discussed our plans for the future."

A. F. Tegen, Appleton, urged company managements to afford their employees every opportunity to become true representatives of companies in their contacts with customers. He said that few industries can get along well today without cooperation of their employees.

Canadian Electrical Association Activities

By B. C. FAIRCHILD, *Secretary*

A meeting of the Executive Committee of the Canadian Electrical Association was held Friday, Nov. 16, at which it was decided to repeat the Winter Conference of Committees which proved so successful last winter.

This will be held Monday, Jan. 21, 1935 at the Windsor Hotel, Montreal. All association committees will meet under their respective chairmen during the morning and part of the afternoon. Starting at 3.30 p. m. the various committees will gather under their respective section chairmen for general discussion. The conference will be closed with a dinner and entertainment in the evening.

Last winter's conference was attended by 135 committee members and an even greater number are expected for the coming meeting.

The 1935 convention of the C.E.A. will be held at the Algonquin Hotel, St. Andrews, New Brunswick, June 26-28, 1935.

A committee appointed to study the scope and aims of the various association committees has practically completed its report and it is expected that a rearrangement of some committees with certain changes as to the work which may be undertaken by them will be necessary and advisable. Certain overlapping of committee work will be overcome and clarification of their scope and aims will assist chairmen in deciding just what subjects come within their jurisdiction for study.

This association had been invited to appoint two members on the Transmission and Distribution Committee of the E.E.I. The Chairman of the Engineering Section (Prof. C. V. Christie) and

the Overhead Systems Committee (Mr. R. H. Mather) have been nominated to the E.E.I. Committee. Both attended the meeting of the Transmission and Distribution Committee held in Chicago, Oct. 22-24.

Nine committees have held meetings so far this season; most of them being in the Engineering Section.

A new amended Constitution of the C.E.A. has been completed and distributed to all members.

The four prize-winning papers of the Customers' Service Competition, held early this year, have been printed and distributed to our member power companies, who in many cases have ordered extra copies for distribution to their local managers and departmental heads.

The Canadian Electrical Association takes this opportunity to wish the Edison Electric Institute and its members a Merry Christmas and a Happy and Prosperous New Year.

Rocky Mountain Utilities Co-operate in Great Merchandising Efforts

By GEORGE E. LEWIS

Managing Director, Rocky Mountain Electrical Association

With 25,000 women already mobilized in one unit of the activity alone, the greatest business-capturing movement ever attempted by the electrical interests of Colorado, New Mexico and Wyoming is sweeping forward under the leadership of the Rocky Mountain Electrical Association.

Flushed with sales victories along the entire merchandising front the past year, the industry's next objective is the Christmas-buying sector.

"Give Something Electrical for Christmas," a time-tested slogan, this year will reach the eyes or ears of every person in the three States—via radio, billboards, newspaper advertising, direct-mail, window-displays, posters, banners, stickers, electrical expositions, contests and other media.

Through the combined efforts of the distributors, utilities and association, hundreds of department stores, specialty shops and other appliance outlets will join in the drive. Thousands of stickers, streamers and cards will greet the eyes of those who pass store windows. "Give Something Electrical" will flash by on hundreds of delivery and service trucks.

Merged with the Christmas merchandising activity is the Better Light-Better Sight movement, in which the new Study and Reading lamp is being promoted. It is in the Study lamp activity that 25,000 women, mostly club members, have been interested, by means of a contest sponsored by the Colorado Women's Service Club, Inc., which is operating through approximately 100 associated clubs.

More than 200 home meetings, at which there will always be between 20 and 50 women present, are now under way. The Study lamp is being demonstrated in each and the message of Better Light-Better Sight being delivered by representatives of the Electrical Association. Tips and actual business growing out of this campaign are distributed among all dealers handling the Study lamp carrying the I. E. S. tag of approval.

To maintain interest and to properly administer the big program, twice-a-month meetings are held in Denver. The results of these deliberations are immediately passed on to all members of the association, with the result that concurrent programs are in effect throughout the three States.

Linked with the tri-State merchandising program is the government's home modernization plan. Through the Electrical League of Colorado, Denver, and other electrical organizations which are cooperating with the association, practically every branch of the industry is profiting through the modernization campaign.

One of the most potent mediums for keeping things electrical before the public is *Electri-News*, a monthly publication, financially supported by every branch of the industry. The whole territory will be blanketed with this eight-page, gayly-colored, and highly-illustrated little publication, for the most part through the utilities.

To keep merchants always informed of the activity, the Electrical Association issues a bi-weekly publication, *Electri-Gram*, containing suggestions for merchandising electrical goods and participating in the campaign.

The women of the industry, not only company employees, but the wives of executives and others, also have been recruited for the Christmas merchandising campaign. They are taking the "Give Something Electrical" gospel to their relatives and friends and are including things electrical among their own purchases, more so than ever.

In various parts of the region, notably at Delta and Grand Junction, Colorado, many thousands of people have been visitors to electrical expositions.

Model electric kitchens are becoming regular adjuncts to the sales and demonstration rooms of the utilities and others engaged in the sales of appliances.

A lighting school, conducted by the General Electric Company, gave decided impetus to the Study lamp and lighting promotion generally, six western States having sent representatives to the courses.

WHAT A WRENCH!

Or What Was Wrong with That Picture

"The terrible wrench shown on the machine foundation in the picture on the front cover of the October BULLETIN I trust was left there 'with malice and aforethought' because my mail has been filled with comments upon it."—W. A. BUCHANAN.

. . . .

"I have had several of my friends 'razz' me because I have no more influence over you than this illustration indicates.

"The wrench is without a wooden handle; is not the right type to use on bearing bolts ("U" wrench should be used); apparently was used with a pipe extension lever; was left loose on the floor, etc., etc.

"We will doubtless hear from the National Safety Council on this."—C. R. BEARDSLEY.

. . . .

The above quotations are from among many comments, in similar vein. The editor admits "malice and aforethought" in the use of the picture on the cover of the October BULLETIN. In the attempt to mitigate his act he pleads that the not unworthy desire to check the alertness and safety consciousness of BULLETIN readers was too great to resist. He is now thoroughly satisfied on these points. —W. C.

New Publications

"Government Experimentation in Business"

If there is anything to the notion that we learn from experience, then Dr. Persons' "Government Experimentation in Business" is a beacon warning the ship of state off dangerous rocks ahead. One must be pardoned, however, if he doubts that one community or one generation learns from the experience of another. Minnesota, for example, seems to be plunging ahead with state adventures of a sort which, over about a generation, failed spectacularly in the adjoining Dakotas. Nevertheless, history is of value to the scholarly discerning few although it may be of little use to blind followers of demagogues.

It is no small service to collect and transmit the record of successes and failures of some past policy. That service Dr. Persons has performed in the field of government-in-business, in the locale U.S.A. Dr. Persons' is no partisan volume. As dispassionately as a surgeon, as painstakingly as any digger of ancient tombs, and as accurately as a physicist in his laboratory, Dr. Persons has dissected for us all of our major state and federal business experiments of the last hundred and fifty years. Some few of these adventures were successful. The great majority were economic failures. That is the record. The pitifully small number of successes —Cincinnati Southern Railway (municipal); possibly the Erie Canal in its first stage; Port of New York Authority (government sanctioned but not government controlled); the George Washington Bridge, for example—seem to have resulted from accidental circumstances.

Perhaps the most interesting part of Dr. Persons' compilation has to do with the period 1820-50. All of the fatal weaknesses of business experiments by a self-governing people were exhibited during that tragic time. Then, too, the happenings of a hundred years ago can be studied without the confusion that present-day partisanship brings to the examination of more recently attempted adventures.

Early American communities were in desperate need of transportation systems. The states were quite unable to provide many free highways, nor were private interests willing to take the risks of extensive toll road constructions. It is not astonishing that states listened to the siren song of "profitable and self-liquidating projects," which, it was hoped, might solve the problem.

Less than twenty years after the Declaration of Independence, a private company built an expensive but highly successful toll road between Philadelphia and Lancaster. Other private companies were successful in a few other instances, but private projects were few in number. States rushed in to build toll roads in areas so difficult and so sparsely settled as to doom most such endeavors to failure even had they been well planned and well managed. Under state planning, extravagant construction and political management, failure was the rule.

Dr. Persons recounts these early public failures in road building, turns to the history of state canals, goes on through the sorry list of state adventures in railroads and in banking. Each instance followed a set pattern. First, a highly profitable state's business, self-liquidating of course, was dangled before the dazzled gaze of the people. Next, state money was appropriated, state bonds voted, construction undertaken. Then, failure, with heavy financial losses, not infrequently followed by repudiation of state debts.

So widespread and so disastrous were these first public experiments in business that Dr. Persons lists no less than twenty-three states which afterward passed constitutional amendments restricting the power to borrow. And all of this was prior to 1850. The lesson had been learned by one generation.

Space does not permit mention of the detail through which succeeding generations repeated the follies of their predecessor. Suffice it to say that Dr. Persons gives an account of all of the more ambitious state and federal business projects up to March 4, 1933; their histories so follow the pattern of 1820-50 —despite new and novel forms that such experiments have taken since the civil war—as almost to make it seem that one is reading the same history that he perused in the earlier chapters.—*Geo. L. Hoxie.*

"Government Experiment in Business." By Dr. Warren M. Persons. Published by John Wiley & Sons, Inc., 440 Fourth Ave., N. Y. 268 pages. $2.50.

Rate Bibliographies Available

The American Gas Association has announced the publication of a bibliography on rates to supplement the one issued in 1930. As these two editions contain references to practically all forms of public utilities, the bibliographies should be of rather extensive interest. The rate references include those on the gas, electrical, telephone, telegraph, water, railroad, heating and refrigeration utilities, and also on the infant public utility, air transportation. The association has been put to considerable expense in making available these valuable tools covering the entire public utility field.

The bibliographies were compiled by Mr. O. E. Norman of The Peoples Gas Light and Coke Company, under the sponsorship of the Rate Structure Committee of the American Gas Association. An indication of the thoroughness and completeness of the work is the fact that there are a total of 8446 references in the two editions.

The first edition was published in 1930 and includes references from 1815 to 1930. The latest edition includes references from 1882 to 1934. The latter necessarily overlaps the former so that for complete coverage both editions should be used together.

The two volumes offer sources presenting: a complete history of public utility rates for 119 years; historical progress of rates for all public utilities; theoretical and practical discussions of all phases of rates; a reflection of governmental, legal and political opinions on rates and related subjects, and contributions of pioneers and leaders of the utilities on rate matters.

Utility executives and associations, rate makers, lawyers, instructors, libraries, utility journals and students of public utilities should find the 1930 and 1934 Bibliographies of Rates for Public Utilities published by the American Gas Association invaluable and indispensable.

Because of the widespread possibilities of application the Association is making these two volumes available to everybody at a cost of one dollar each, which barely covers printing costs. There are but few copies of the 1930 edition in stock, and only a limited number of the 1934 edition was printed. Orders will be filled as received and should be addressed to the American Gas Association, 420 Lexington Avenue, New York, N. Y.

Outdoor Weathering of Metals and Metallic Coatings

The American Society for Testing Materials has published recently a 115-page booklet, entitled "Symposium on the Outdoor Weathering of Metals and Metallic Coatings." This consists of the following five papers all of which were presented at the Regional Meeting of the ASTM held in Washington, D. C., March 7, 1934:

1—Outdoor Test Results on Bare and Metal-Coated Ferrous Specimens—by C. D. Hocker, Chemical Engineer, Bell Telephone Laboratories, Inc., N. Y. C.

2—The Harmony of Outdoor Weathering Tests—by R. F. Passano, Research Engineer, Research Laboratories, The American Rolling Mill Co., Middletown, Ohio.

3—The Influence of Rainfall and Smoke on the Corrosion of Iron and Steel—by G. N. Schramm, Corrosion Research Laboratory, American Sheet and Tin Plate Company, Vandergrift, Pa., and E. S. Taylerson, Manager, Research Laboratory, American Sheet and Tin Plate Company, Pittsburgh, Pa.

4—The Early Interpretation of Test Results in the Atmospheric Corrosion of Non-Ferrous Metals and Alloys—by W. H. Finkeldey, Metallurgist, Singmaster & Breyer, N. Y. C.

5—Galvanic Corrosion by Contact of Dissimilar Metals—by C. L. Hippensteel, Member of Technical Staff, Bell Telephone Laboratories, Inc., N. Y. C.

Each of the above papers is followed by a discussion, and in addition, a few pages of general discussion is given at the end of the publication. By means of footnotes throughout the papers and discussion, references are made to numerous other articles, reports, papers and ASTM Proceedings which go to make up the available literature on these subjects.

Nearly twenty years ago, certain committees of the ASTM undertook to make atmospheric tests on iron and steel specimens of commercial products with a view to determining their resistance to corrosion under different climatic conditions. Test stations were set up at several locations, most of these having weather conditions known to be unfavorable to metals and metallic coatings, one at State College, Pa., known to be a very mild agricultural area, and one at Key West where conflicting information concerning weathering rates on metallic coated products had been obtained. The papers included in this symposium deal primarily with an analysis of performance data obtained from outdoor weathering tests carried out by the Society's Committee A-5 on Corrosion of Iron and Steel and Committee B-3 on Corrosion of Non-Ferrous Metals and Alloys, and from independently made investigations in which the authors have considerable confidence.

For several years, engineers of the electric light and power industry have been interested in the performance of certain metallic coatings and so-called corrosion resisting alloys. This interest has centered particularly around the zinc coatings of pole line materials, structural members and certain alloys used for overhead line conductors and for enclosing equipment located in subways and manholes. The paper on Outdoor Test Results on Bare and Metal-Coated Ferrous Specimens discusses both sheets and hardware and it is the latter which should be of primary interest to electric light and power company engineers.

One station for testing specimens of commercial hardware was located at each of the following places: Altoona, Pa.; Pittsburgh, Pa.; Sandy Hook, N. J.; Key West, Fla.; and State College, Pa. Hardware specimens having protective metal coatings applied by commercial processes and presumably of weights and thicknesses for commercial uses, were tested at each of these stations so that comparisons could be made of coatings applied by the following processes: hot-dipped zinc, electro-deposited zinc, sherardized (zinc) electro-deposited cadmium, hot-dipped aluminum, hot-dipped lead and Parkerized coatings. Approximately 700 specimens have been exposed since early in 1929 and data have been published which show the percentage area of each specimen corroded, based on two inspections each year.

The papers on The Influence of Rainfall and Smoke on the Corrosion of Iron and Steel and The Early Interpretation of Test Results in the Atmospheric Corrosion of Non-Ferrous Metals and Alloys, should also be of interest to electric utility engineers. The first of these two papers gives results of observations taken at three locations, Kearney, N. J.; Vandergrift, Pa.; and South Bend, Pa. (near Vandergrift). The specimens under observation in these tests were sheets from different manufacturers, there being eight different commercial open-hearth low-carbon products, two copper steels, two copper irons, two plain irons, two plain steels and one wrought iron. Although utility engineers are not as a rule heavy users of sheets or sheet products, observations on sheet specimens in tests of this nature should throw considerable light on these materials in other forms.

The latter of these two papers is based on observations taken over a one-year period at four stations in industrial atmospheres, three in marine atmospheres and two in rural atmospheres, one of these being in Arizona, and on tests by Friend made in Birmingham, England over a seven-year period. Conclusions are given based on the ASTM tests which show in a comparative way the performance of the various non-ferrous metals and alloys when subjected to the three general kinds of atmospheric conditions.

Copies of this symposium may be obtained from the American Society for Testing Materials, 260 South Broad Street, Philadelphia, Pa., at $1.25 per copy in paper binding and $1.50 per copy in cloth binding.

New "NEMA Motor & Generator Standards" Published

Superseding and greatly amplifying the 1930 edition, the new "NEMA Motor & Generator Standards" has now been published by the National Electrical Manufacturers Association.

The 1934 edition of the NEMA Motor & Generator Standards brings together much information not heretofore published and constitutes a reference work of practical information concerning the manufacture, test and performance of AC and DC motors, generators, and combinations of both.

The general sections of the new book and the section on Definitions which defines over 150 terms used in dealing with motors and generators have been considerably amplified.

In response to innumerable requests received from many varied industries, the standardized mounting dimensions for motors have been included in the new publication.

Sections added to the 1934 edition of "NEMA Motor and Generator Standards" include:

Direct-current Generators (General Purpose Sizes)
Buffer and Grinder Motors
Motor-generator Sets (150 Kw and Smaller)
Motion-picture Motor-generator Sets.

The new "NEMA Motor & Generator Standards" contains 176 pages in strong flexible linen binding, size 8 x 10½ inches. It may be purchased for $2.00 per copy from the National Electrical Manufacturers Association, 155 East 44th Street, New York City.

POWER SALES ITEMS

AIR CONDITIONING

"Choosing the Right Air Conditioning System," by A. W. Canney. Heating, Piping & Air Conditioning, November, 1934, p. 455. Keeney Publishing Company, 1900 Prairie Avenue, Chicago, Ill.

"Air Conditioning in the Rockefeller Center Development," by A. W. Canney. Ice & Refrigeration, November, 1934, p. 205. Nickerson & Collins Company, Publishers, 435 N. Waller Avenue, Chicago, Ill. New York office, 520 Singer Building.

Description of the Music Hall and Center Theatre systems.

"The Importance of Air Conditioning." Plumbing and Heating Magazine, November, 1934, p. 12. Commerce Publishing Co., 505 Arch Street, Philadelphia, Pa.

A paper stressing the importance of air conditioning for dealing with suspended impurities in the air.

"Tailor-Made Weather," by R. B. Purdy. Power, November, 1934, pp. 605-607. McGraw-Hill Publishing Company, Inc., 330 West Forty-second Street, New York City.

An elementary discussion of the what and how of air conditioning, which tends to take some of the mystery of the new industry which uses old ideas.

"Reducing Air-Conditioning Operating Costs." Heating, Piping and Air Conditioning, October, 1934, p. 431. Keeney Publishing Company, 1900 Prairie Avenue, Chicago, Ill.

Efficient use of condensing water brings about reduction in air conditioning operating costs.

"Air Conditioning in Grocery Stores." Heating, Piping and Air Conditioning, October, 1934, p. 418. Keeney Publishing Company, 1900 Prairie Avenue, Chicago, Ill.

Example of increased sales and additional net profit due directly to air conditioning.

BAKERIES

"Power for Bakery." Bakers Weekly, November 10, 1934, p. 39. Bakers Weekly, Publishers, 41 West Forty-fifth Street, New York City.

Bakery saves $15,000 yearly by purchasing power.

BREWERIES

"Brewer Betters Heat Balance," by Charles Stoeckly. Electrical World, November 10, 1934, pp. 36-37. McGraw-Hill Publishing Company, Inc., 330 West Forty-second Street, New York City.

When the steam-driven ammonia compressors driven by reciprocating engines had to be replaced, the Rainier Brewery of San Francisco improved their heat balance by the installation of synchronous motors for driving the compressors, and a turbine-driven induction generator for supplying some of the power requirements and process steam. Since some utilities hesitate to permit industrial plants to operate in parallel with their systems, more extensive use of induction generators may be an answer to this problem.

ELECTRIC DRIVE

"High-Speed Reversing Drives," by H. S. Stewart. Electrical World, November 10, 1934, p. 828. McGraw-Hill Publishing Company, Inc., 330 West Forty-second Street, New York City.

With machines having a cyclic duty it has long been recognized that if the return movement after a working stroke could be speeded the productive capacity of the machine could be increased.

"Controls That Aid Production," by George H. Hall. Electrical World, October 27, 1934, p. 26. McGraw-Hill Publishing Company, Inc., 330 West Forty-second Street, New York City.

Protection and continuity of operation essential in industrial production—how electrical control does its work—controls available and their application.

ELECTRIC FURNACES

"Induction Furnaces." Metal Progress, October, 1934. Metal Progress, Publishers, 25 West Forty-third Street, New York City.

Advantages of having an induction furnace in a plant; comparing high and low frequency operations.

ELECTRIC HEATING

"Building a Heating Load," by C. P. Yoder. Electrical World, October 27, 1934, p. 30. McGraw-Hill Publishing Company, 330 West Forty-second Street, New York City.

Some interesting evidence of the value of advance promotion in the development of electric heating business.

ELECTRIC MOTORS

"Starting Synchronous Motors," by J. Leech-Porter. Electrical News & Engineering, October 15, 1934, p. 34. Hugh C. MacLean Publications Company, Ltd., 347 Adelaide Street West, Toronto 2, Canada.

How to determine their required characteristics.

GROUP DRIVES

"Group Drive." Electric Light and Power, November, 1934, p. 42. Bennett-Watts-Haywood Company, Publishers, 360 North Michigan Avenue, Chicago, Ill.

Group drive advocated for industrial plants. Case studies available.

"Advantages of Group Drive." Glass & Industrial Marketing, December 1, 1934, p. 1. Glass Industry Publishing Company, Inc., 2 Duane Street, New York City.

Forceful presentation of group drive advantages by Power Transmission Council.

METERS

"Controlling KW Demands." Power, November, 1934, p. 613. McGraw-Hill Publishing Company, Inc., 330 West Forty-second Street, New York City.

Graphic wattmeter with alarm contacts, controls maximum demand.

POWER COSTS

"How to Reduce Purchased Power Bills," by J. F. Gaskill. Factory Management & Maintenance, October, 1934, p. 434. McGraw-Hill Publishing Company, Inc., 330 West Forty-second Street, New York City.

Power costs are a potential source of direct net profits. A dollar lost in sales may mean but five cents lost in net profits. But a dollar lost in power costs is 100 cents lost in net profits.

POWER FACTOR

"Makes P. F. Correction Pay," by J. W. Nash. Electrical World, October 13, 1934, pp. 47-49. McGraw-Hill Publishing Company, Inc., 330 West Forty-second Street, New York City.

In this article Mr. Nash describes how the Bendix Aviation Corporation of South Bend, Ind., attacked the problem of poor power factor, and gives the results obtained.

POWER PLANTS

"Select the Right Turbines for Your Industrial Power Plant," by Roland S. Fitch. Power, November, 1934, pp. 598-600. McGraw-Hill Publishing Company, Inc., 330 West Forty-second Street, New York City.

PUMPS

"Rotary Pumps—Their Operation and Application," by William E. Bakewell. Power, November, 1934, pp. 602-603. McGraw-Hill Publishing Company, Inc., 330 West Forty-second Street, New York City.

This article describes various types of rotary pumps, their characteristics and applications.

TRANSPORTATION

"The Trolley Coach of Today," by R. H. Sjoberg. General Electric Review, August, 1934, pp. 387-389. General Electric Company, 1 River Road, Schenectady, New York, Publishers.

Recent developments in the electrically propelled trolley coach have placed this form of transportation in a position where it can show decreased costs and increased revenues over both the conventional trolley car as well as the gasoline operated bus. The decreased costs are due to lowered maintenance charges, increased speeds and lowered operating cost. At 1.25c. per kilowatt hour a 40 passenger coach would cost 2.8c. per coach mile for electric power. A gasoline bus in the same service would cost approximately 4c. per bus mile. The electrical equipment on the coach line could be maintained for approximately .4c. to .5c. per coach mile. Increased revenue results from increased comfort of passengers due to easier riding, together with better heating facilities in winter, higher speed, and greater reliability. As an example of reliability, trolley coaches in Dayton have operated 700,000 miles without an electrical equipment failure.

The Accident Prevention Committee

(Continued from page 408)

subject until more becomes available on Cause & Locus.

(e) *Non-injury Accidents.* This is a broad subject and was held for further discussion.

(f) *Interlocking.* Some work had been done on the related subject "Hold Off," also other EEI Committees are interested. Further discussion is necessary before action will be taken.

(g) *Traffic-Employee Accidents.* Opinion differs as to how this type of accident can be more closely controlled. It was assigned for further study.

(h) *Employee Training.* Some previous work had been done on this subject. Action was deferred until this is reviewed.

(i) *Office Accidents.* Following a brief discussion this was assigned with instructions to contact those dealing with accounting work.

(j) *Public Accidents.* This was considered to be a public relations problem. No action was taken.

(k) *New Devices.* It was decided that the Committee as a whole would give this further study.

The chart shown on page 407 was prepared for the purpose of submitting the Accident Prevention Committee Organization, Scope and Personnel for consideration by the Operating Committee. The latter, at its meeting on Oct. 25, approved this plan as submitted.

The Committee feels gratified in reviewing the accident statistics for 1933 (see Table I, page 408) and in comparing statistics for the last four years with objectives set by the Accident Prevention Committee of the N.E.L.A. in 1929. At that time the Days Lost per 100 Employees per Year had been reduced to 107 from 146 in 1923; the Lost Time Accidents per 100 Employees per Year had been reduced to 6.9 from 9.7 in 1923; and the Fatalities per 1000 Employees per Year had been reduced to 1.37 from 1.7 in 1923. Some believed that these ratios were the minima and further reductions could not be made. Others believed that still further reductions could be made and as a "mark to shoot at" established the ratios of 25, 2.5 and 0.5 respectively as objectives for 1936. The ratios for 1933 are 53, 214 and 0.66 respectively. The progress in accident reduction as here described is shown in Table II. With but one exception and that for but one year, the ratios since 1929 have been lower than the corresponding values on the trend curves established by the 1936 objectives. This is all very clearly illustrated in an article entitled "Retaining Improvement in Accident Prevention" by C. R. Beardsley which appeared in the EDISON ELECTRIC INSTITUTE BULLETIN for July, 1934.

TABLE II

	1923	1929	1933	Objective Set for 1936
Days Lost per 100 Employees per Year	146	107	53	25
Lost Time Accidents per 100 Employees per Year	9.7	6.9	2.14	2.5
Fatalities per 1000 Employees per Year	1.7	1.37	0.66	0.5

Glaze (Sleet) Storm Data

For the fifth consecutive year, arrangements are being made to obtain detailed reports on ice deposits on overhead electric power lines and simultaneous wind velocities, through approximately 35 weather bureau stations and 65 power companies. In all, there are approximately 150 different locations throughout the so-called heavy loading and medium loading territories where observations will be taken in case glaze storms occur.

This work was started six years ago and it is hoped to continue taking observations and reports for 5 years more in order to obtain authentic and complete information over a 10-year period. From this it is hoped to obtain sufficient data for use in determining the proper ice and wind loading assumptions applicable to overhead electric power line construction. The cooperation of all companies, even those with whom no arrangements have been made, will be appreciated by the subcommittee that is in charge of the collection of this data.

National Safety Codes

According to *Industrial Standardization,* forty-four national safety codes, providing specifications for safety devices, and for safe operation and use of equipment, have been approved by the American Standards Association.

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CONVENTIONS AND MEETINGS

DECEMBER

3-4 National Industrial Council, Waldorf-Astoria Hotel, New York, N. Y.

3-8 Eleventh National Exposition of Power and Mechanical Engineering, Grand Central Palace, New York, N. Y.

3-8 American Society of Mechanical Engineers, New York, N. Y.

JANUARY

10-12 American Engineering Council, Washington, D. C.

22-25 American Institute of Electrical Engineers, New York, N. Y.

MARCH

29 Southeastern Electric Exchange, Savannah, Ga.

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